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STREET CLEANING METHODS

Sweeping by Machine and Hand, Flushing and Sprinkling, and Other Street Cleaning Operations Discussed in Report of Rochester Bureau of Municipal Research—Patrol Routes—Equipment and Its Use.

Two things stand out as fundamental to economic success in street cleaning—effective organization, and application of scientific engineering principles to the development of work methods and to the design and use of equipment. The latter division of the subject forms Part II of a report by the Rochester Bureau of Municipal Research,* submitted at the request of the Commissioner of Public Works, which is given in quite full abstract herewith.

STREET DIRT.

The demands of a proper removal of refuse from the street surface require that the dirt be picked up at or as near as possible to its point of origin in the street, not being pushed along by broom or scraper and smeared over clean places; and that it be collected as near the time of origin as possible and not be allowed to blow around and be spread over the pavement by vehicles. The origin of street dirt of various kinds, possible means of decreasing its amount and ordinary methods for laying or removing it are given in the accompanying table. Other occasional sources of dirt are the placing of building materials in streets, dirt thrown from roofs and windows, street repairs and excavations, refuse barrels set out for collection, and sweepings from sidewalks.

Poor pavements of any kind are a source of much dirt, and increase the difficulty of removing it. In 1915 (more recent figures are not available) the cost of cleaning pavements in Rochester was as shown in the accompanying table.

Street cars are a source of considerable dirt and the tracks interfere with effective cleaning. The sand used on the rails makes fine dust. Smoke also makes appreciable deposits, it having been calculated that in the closely occupied area of New York 575 tons of cinders and soot are deposited per square mile per year.

*For an abstract of Part I, see Municipal Journal for January 18th.

A large amount of litter is due to the throwing into the roadway of papers and rubbish from stores and fruit stands. In the residential districts, grass, trimmings from shrubs and trees, leaves, etc., are thrown into the gutter for city collection, contrary to ordinance requirements. Using the pavement as a mixing board for concrete and mortar results in rough, unsightly spots that are difficult to clean.

HAND SWEEPING.

Any standard of cleanliness must be more or less arbitrary because, theoretically at least, if there is any dirt on a street, that street is not clean. But in applying a standard of cleanliness to street pavements swept by hand, the fine dust should not be taken into consideration, because it cannot be removed by the tools used by street sweepers. According to Richard T. Fox, "The length of time any refuse, other than dust, is permitted to remain on the street will determine the standard of cleanliness of that street." Mr. Fox's intensive method of cleaning requires that the patrolmen first make a clean-up of the

Unit Costs of Cleaning Different Kinds of Pavement.

Kind of pavement.	Yearly cost per 1,000 sq. yds.	Ratio of cost to cost of cleaning asphalt.
Medina stone block (almost exclusively in the business district)	$22.98	153
Brick (none in business districts)	15.54	104
Asphalt	14.96	100
Wood block (practically all in residential districts)	13.42	96
Averages	$16.72	112

Kinds and Sources of Street Dirt.

Kinds of Street Dirt	*Possible Means of Decreasing Amount of Street Dirt*	*Ordinary Methods Employed in Laying or Removing Street Dirt*
Blown dust	More frequent cleanings	Sprinkling, sweeping, flushing
Smoke and coal dust	Stricter enforcement of smoke ordinance	Sprinkling, sweeping, flushing
Horse droppings	None	Sweeping and scraping
Paper and refuse thrown by pedestrians	Police vigilance and public cooperation	Paper barrels, sweeping *(Sidewalk sweeping downtown)
Sand from car tracks and block pavements	None	Sweeping and flushing
Dirt dropped from vehicles	None	Sweeping and flushing
Hay from hay wagons	None	Sweeping and flushing
Leaves	Require them to be put in barrels or bags or burned	Sweeping and pick-up teams
Lawn rakings	Require them to be put in barrels or bags or burned	Pick-up teams
Mud from unpaved streets and allays	Pave such streets and alleys	Sweeping and pick-up teams.

*Sidewalk sweeping downtown by the Department of Public Works would aid greatly in keeping the streets clean and in overcoming the results of present haphazard methods employed by individuals.

night's deposits, and then make a number of trips over their routes picking up deposited refuse. It was found in Chicago that by so doing no refuse needed to remain on the street more than 15 minutes before it was removed. The men on this work traveled an average of six lineal miles a day, in comparison with 4½ miles traveled in following the older and more universal method in which sweeping is done almost the entire distance; they did more walking but less sweeping.

The 15-minute standard of cleanliness must of course be modified to suit the length of route of the patrolman, since the longer the route the less the number of trips that he can make over it. Many things must be considered in determining the area limits of patrol routes; no definite rule can be made for any one type of pavement, and the practicable area varies with the type. Following factors should be taken into account in laying out patrol routes for individual sweepers:

1. *The ability and agility of the sweeper.*—This is an important factor on busy streets and affects the quantity of work accomplished as well as the safety of the men.

2. *The quantity of dirt deposited.*—This can be determined only from daily reports of the number of tubs filled on each route. The amount of dirt a sweeper picks up in a day, while not a true index to the work done, is yet a valuable factor in comparing the work on different routes and the work of a given man on his own route from day to day.

3. *The amount and kind of traffic.*—Congested traffic causes many delays and much lost time. Sweepers on busy streets have to keep one eye on moving vehicles, and their work is hampered by those standing along the curbs. Horse-drawn traffic makes more dirt than automobiles and is in the way longer, but is less dangerous to the sweeper.

As a safety precaution, sweepers should be required to sweep against traffic, so that their backs will not be turned to approaching vehicles.

4. *The kind and condition of pavement.*—The smoother the surface, the easier and cheaper it is to clean. Other things being equal, the ease with which pavements can be cleaned is in the order—wood block, asphalt, brick, Medina block (dressed stone), Medina stone (undressed). (This refers to these pavements as laid in Rochester.)

5. *The amount of walking required.*—The more trips a man makes over his route, the shorter will be the time during which a deposit of dirt remains on the street.

6. *Straightness of route.*—From a control standpoint, straight routes are best, because the foremen can find the men more quickly. Also the fact that a sweeper can be seen somewhere on a street at all times makes people better satisfied and less liable to make complaints. This psychological effect produced by the visibility of the sweeper is borne out by local experience.

7. *The area.*—This must vary with the locality, the amount of dirt and traffic and the condition of the pavements.

8. *Number of men on a route.*—Sweepers work better alone than in pairs, because they have less temptation to stop and talk and because the progress of a pair is always at the rate of the slower one.

9. *The proximity to the sweeper's home.*—It has been found locally that some of the men do their best work and take most pride in keeping clean the streets near their own homes. However, there is a temptation in such cases to take long dinner hours and go in to rest frequently. Sweepers so situated doubtless would require close supervision, but negligence can soon be detected by the appearance of the route.

The limiting areas proposed for Rochester for each of the four classes into which the streets are divided by the authors of the report are as follows:

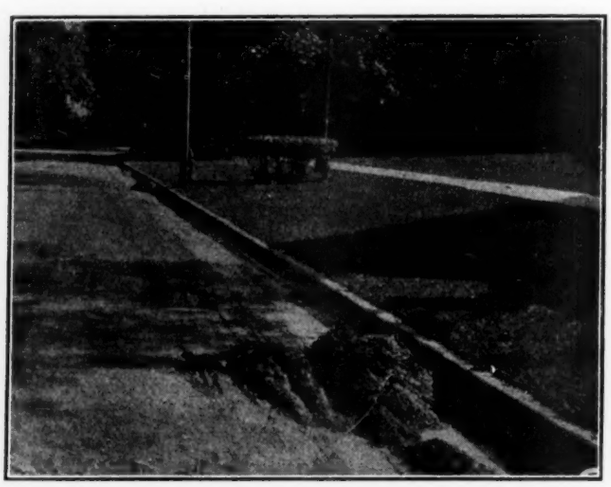
Limiting Areas for Sweepers' Patrol Routes (Square Yards).

Kind of Pavement	Present Practice	Proposed Practice	Streets
Asphalt	12,445	8,000 to 10,000	Business
Asphalt	25,372	10,000 to 20,000	Semi-business
Asphalt	12,110	8,000 to 15,000	Tenement
Asphalt	25,825	12,000 to 25,000	Residential
Brick	No brick	No brick	Business
Brick	19,184	6,000 to 15,000	Semi-business
Brick	13,092	7,000 to 13,000	Tenement
Brick	18,000	10,000 to 20,000	Residential
Medina	7,166	2,000 to 5,000	Business
Medina	14,000	3,000 to 6,000	Semi-business
Medina	11,676	3,000 to 6,000	Tenement
Medina	13,410	4,000 to 7,000	Residential
Mixed	14,963	3,000 to 6,000	Business
Mixed	16,920	5,000 to 10,000	Semi-business
Mixed	13,222	4,000 to 8,000	Tenement
Mixed	26,707	7,000 to 22,000	Residential

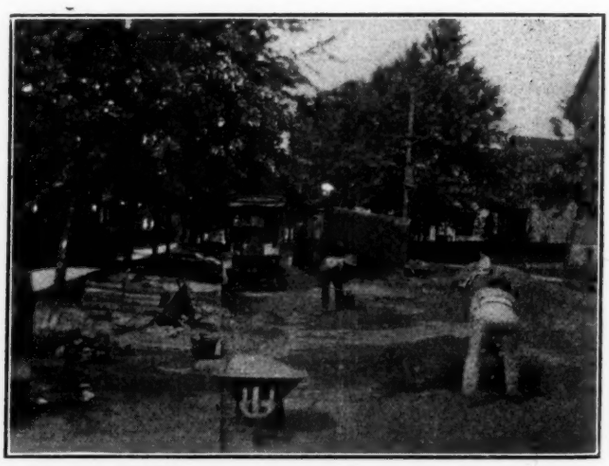
PATROL SWEEPERS' TOOLS.

The equipment of patrolmen in Rochester, which is considered satisfactory for the most part, weighs approximately 115 pounds. It consists of 1 push broom or pan scraper, 1 short handled house broom, 1 Davis scoop shovel, 1 removable wooden barrel on a push cart, or 1 box cart.

The brooms used are made in three sizes—18, 24 and 36 inches in width. The fibre brooms for general use are made of African bass. They consist of six rows of fibres seven inches long, set in a block usually eighteen



YARD RAKINGS IN GUTTER.
Placed there late Saturday afternoon, and remained uncollected until Monday.



CONTRACTORS USING ASPHALT PAVEMENT FOR MIXING BOARD FOR MORTAR.
Leaves unsightly stains and rough places.

inches long. When the fibres are worn down to four inches, brooms should be discarded. Eighteen-inch wire brooms are used for sweeping Medina block pavements. The 36-inch push brooms are useful in gathering wet leaves, but for general use they are too heavy for the average man to handle effectively. The 18-inch and 24-inch sizes have been found to give the best all-around results.

The handles of the push brooms are all about six feet long when new, but it is difficult to find handles even six feet long, because the men make a practice of cutting them down. The result is that they make harder work for themselves, because they have to bend their backs unnecessarily. Street sweeping should be done with alternate short and long, full, freearm strokes, which is impossible with short broom handles. Broom handles should be made in two lengths, six feet and six and one-half feet long, for tall and short men. The handles should be set at such an angle that all the broom fibres are in contact with the street surface when the sweeper uses the broom properly. The broom should be held firmly with both hands, one close to the end of the handle and the other about two feet from it, both hands with the knuckles outward. Sweepers should be able to sweep on either side.

As freezing weather makes sweeping difficult, brooms should be supplied with iron scrapers on the upper edge so the broom head may be turned over and used for scraping hard cakes of dirt, and for getting dirt out of crevices.

The pan scrapers are used on asphalt pavements in summer in place of a broom. In winter they have proved useful in scraping snow from all types of pavements. These scrapers consist of a flat sheet of steel, turned up at both sides and back, with a cutting edge in front. The pan is about three feet wide and one and one-quarter feet long, with a long, straight handle attached. It is believed that better results would be obtained if the handles of the scrapers were set at an angle with the pans. This would increase the carrying power of the pans, and would make possible proper gripping of the handles.

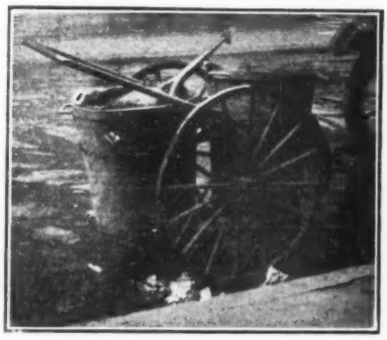
The scraper should be grasped in the same manner as the broom, and should be pushed along on one side of the body, never in front of it. In using pan scrapers on smooth pavements, care should be taken not to smear moist dirt over clean portions of the pavements. If moist deposits cannot be carried along in the scraper pan, they should be picked up immediately, and not pushed along in front of it. Dirt should be brushed or scraped up into piles in the gutter, about 18 inches from the curbs, and picked up by means of a short-handled house broom and a short-handled scoop shovel, and placed in a tub or barrel on a barrel carrier.

METHOD OF FASTENING COVER TO CAN.
Iron scraper on back of broom adds to its usefulness.

The barrels are wheeled about on wooden carriers which are made at the repair shop at a cost of $11 each. Last summer the Department owned 245 of them, and more have been manufactured since then. They weigh 70 pounds each, which is a little heavier than necessary, but they are well balanced and substantial.

The removable barrels or tubs have a capacity of 0.16 cubic yard and weigh 40 pounds each. Each sweeper uses from four to eight of these a day, depending on how often they are emptied by the pick-up teams. At the close of last season the Department owned 1,225 of them, which were used solely for the purpose of collecting street refuse. These tubs were purchased for $4.50 each, unpainted, and last a number of years.

In many localities the owners of vacant lots request that the street sweepings be used for filling in low places. The sweepers on streets adjacent to those lots are supplied with box push carts having a capacity of 0.72 cubic yard instead of tubs and tub carriers. The box carts have slides in the front end, which make it easy to dump the loads out on the ground. This manner of disposal is convenient and cheaper than when the material is removed by the pick-up teams. These carts have 4½ times the capacity of the tubs. Forty-nine of them were used last summer and fall for collecting street refuse and leaves.

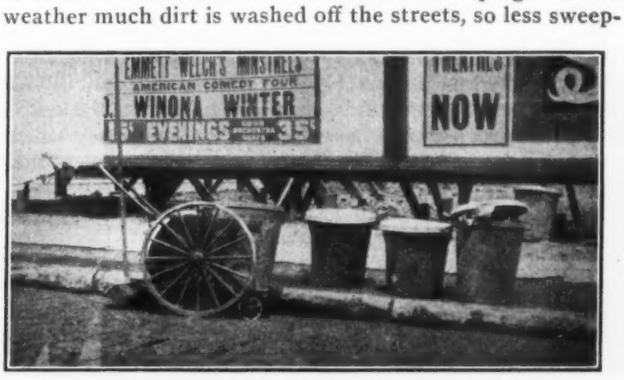


DOUBLE CAN CARRIER.
Reduces amount of walking necessary. Used in New York City, but not in Rochester.

In sections of the city where there is a large amount of litter, patrol sweepers should have a burlap bag (similar to those proposed for use by litter patrolmen) in addition to their regular equipment. This bag should be carried over the route when collecting papers, cans, fruit skins and other large pieces of litter prior to sweeping. When not in use, the bag can be hung on the barrel carrier.

SWEEPING PROCEDURE.

The best sweeping can be done in dry weather, because a broom has little effect on wet mud. Care should be taken, however, to grasp and use the brooms properly so as not to raise a cloud of dust when sweeping. In wet weather much dirt is washed off the streets, so less sweep-



EXTRA CANS KEPT COVERED.
To prevent dirt and paper from blowing from them and flies from gathering and depositing eggs.

ing is required. However, sweepers should be prepared to stay out during rain storms, because they are needed then to keep the sewer inlets open and the gutters free from obstructions to drainage, to sweep mud and water from depressions in the pavements, and to make the crosswalks as free as possible from mud and pools of water. In wet weather the sweepers are laid off in Rochester, on the assumption that it is economy to do so and because (it is said) the men are glad to get holidays. The results of this practice are dirty streets, clogged inlets, muddy crosswalks and accumulated litter. It is evidently false economy.

The best modern street cleaning practice indicates that the first two hours in the morning can best be devoted to a general clean-up of the night's accumulation. The remainder of the day then should be spent in patrolling the routes and in picking up the dirt and refuse deposited during the day. After the first clean-up the sweeper should cover his route as many times as is conducive to good results.

When there is a considerable deposit of litter, this should be attended to first. Following the litter pick-up work, sweeping should be done starting at the center of the street and working toward the gutter, in the direction of the long joints of block pavements. The work should progress in the face of traffic so the sweeper can keep an eye on approaching vehicles. (The white uniform is a factor of safety to the sweeper, because drivers can see at a glance that the wearer's place is in the street.) After dirt is swept to the gutter, it should be brushed or swept into piles about 75 feet apart and not less than 18 inches from the curb. Not more than three piles should be left on the street at a time. The dirt should be picked up and placed in the barrels as soon as possible, to keep it from being scattered, thus saving unnecessary extra work.

Varying conditions of traffic and pavement have a marked effect upon the procedure which patrol sweepers should follow. On smooth pavements in residential districts, automobile traffic sends most of the dirt away from the center toward the gutters. On many such streets no sweeping is necessary in the center. Occasional deposits of dirt and horse droppings should not be swept to the gutter, but should be picked up in place with a shovel and house broom. The eight or nine feet of pavement nearest each curb require regular sweepings, which, on smooth pavements, should be done longitudinally and in the direction opposite to the movement of traffic. Thus the route may be covered by one trip each way, with occasional stops to pick up deposits and to pile dirt in the gutters. Streets of this kind should be flushed at least three times a week, to remove fine dust which cannot be removed by the sweeping.

On car track streets the problem is not so simple, even where other traffic is light. Track areas in Rochester are paved with Medina blocks, bricks or wood blocks, whether or not the remainder of the street is paved with asphalt. Track paving, especially at switches and crossovers, is apt to be rough and uneven and hence hard to clean. Dirt must be swept out of the rail grooves and switches, and the rough pavement requires extra cleaning. On the single-track streets, the entire track area should be swept in the direction of the long joints of the blocks and toward one side. On double-track streets the track areas should be swept from the center to each side. If possible, the dirt from the track areas should be picked up without first sweeping it to the gutters. If the dirt is heavy and cannot be picked up conveniently near where it lies, it should be swept and piled in the gutters as is necessary on heavy-traffic streets.

On business and semi-business streets, where traffic is heavy and car tracks are usually to be encountered, more sweeping is necessarily required than on outside streets. On such streets the sweeper should start at the center and sweep toward the gutter a distance of one stroke. After a window is made 20 or 25 feet long, the dirt should be carried another stroke's length toward the gutter. This should be repeated until the whole 20-foot section is swept to the gutter, when the process should be repeated on the next 20 feet of pavement. After the route is well swept up, the remainder of the day should be spent in patrolling, picking up paper and deposits as near the point of origin as possible and as soon as possible.

The most common faults noticed in the work methods employed by local street sweepers may be summed up in the following:

"DON'TS FOR SWEEPERS."

1. Don't let paper or litter of any kind remain on the street.
2. Don't sweep across a clean place. Shovel up the deposit where it lies.
3. Don't sweep into sewer inlets or depressions in the pavement.
4. Don't raise clouds of dust when sweeping.
5. Don't slide the broom along the street. Use short and long strokes strong enough to move the dirt the first time.
6. Don't sweep against a strong wind.
7. Don't work with traffic except when absolutely necessary. Work against it so you can see approaching vehicles and avoid accident.
8. Don't forget to report the following to the foremen: Dead animals, water leaks, clogged inlets, depressions in pavements, and violations of the ordinances affecting cleaning and collection work.
9. Don't deposit dirt anywhere but in the collection barrels.

The contents of the sweeper's barrels and dirt or leaves piled along the gutters are picked up by teams, Rochester using two horse-drawn five-yard———* dump wagons, each accompanied by two loaders with large, flat shovels in addition to the driver. The sweepers keep their full barrels in a definite place and the contents are collected at least once a day. Enough pick-up wagons should be used so that it will not be necessary to leave full barrels out over night, or piles of dirt or leaves left behind machine sweepers. If street refuse is not removed shortly after being brushed up and piled, it not only gives an otherwise clean street an unsightly appearance, but the refuse blows about and makes extra work later on.

It was recommended that the city experiment with the use of motor trucks for this pick-up work in residential district where the hauls are long, keeping careful account of unit costs in comparison with team costs on the same work in the same locality.

To be continued.

COST OF HIGHWAY MAINTENANCE IN WASHINGTON.

In the state of Washington a state-regulated, county-administered system of maintenance has been in operation on the primary highways since June, 1917. At the end of 1917 the State Highway Commissioner, James Allen, from his experience of that year, prepared for use in 1918 a form for annual estimates and monthly reports embodying a simple but complete system of itemized cost-keeping. By use of these, valuable records were assembled from which can be ascertained the exact main-

*Name censored. See editorial in this issue.

tenance and repair expenditures and apportionments of equipment cost upon each section of nearly 1,400 miles of highways.

The division of highway sections is by types of construction, so that there are reported separately the maintenance costs of brick, concrete, asphalt, asphaltic concrete, and bitulithic pavements, and of bituminous and water-bound macadam, crushed rock, gravel and natural earth surfaces. It is believed that five years of consecutive cost keeping is necessary for making any convincing comparisons of maintenance costs of different types. However, the figures for the first year have considerable interest.

The first year's expenditures (June, 1917, to May, 1918, inclusive) for maintenance, repairs and equipment for the primary highways totaled $430,188.63, and averaged $327.84 per mile. However, the returns for the first eight months of 1918 indicated that for that year the cost would average about $400 a mile. This is believed to be a maximum based upon the highest cost of labor and materials ever known, and $300 per mile is probably a safe estimate of the average cost.

Comparing costs by counties, the averages are found to vary from less than $100 up to $1,000 a mile. "Many local factors enter into these varying county rates of expenditure, especially those relating to comparative traffic wear, types of constructon, inclusion of incidental improvements with maintenance costs, excessive repairs required to overcome flood effects in certain counties, extensive purchase and apportionment of maintenance equipment and particularly the different plans of maintenance organization and supervision in the thirty counties. While these local factors justify substantial variances between county mileage cost averages, it is certain that the range of difference shown by the records is far too wide, and invites most serious attention by the responsible county authorities.

"In January, 1919, the completed record of 1918 maintenance expenditures will be available. A series of tabulated cost statistics covering the two annual periods (June-December, 1917, and January-December, 1918) arranged by counties, by highways, and by types of surfacing construction in convenient form for purposes of record and comparisons, will then be compiled and published as an appendix to this biennial report and particularly for February and March reference by the members and committees of the 1919 Legislature Session."

BASE CONSTRUCTION ON STEEP GRADE.

The illustration shows a method employed for placing the concrete in a pavement base on a steep grade. The concrete mixer was set at the top of the grade and a sectional wooden chute was laid from the mixer to the bottom of the grade. The grade was one of 26 per cent. and the concrete ran to the bottom of the chute by gravity with very little assistance. Concreting was begun at the bottom of the grade, and as the completed base advanced up the hill, section after section of the chute was removed.

PLACING CONCRETE BY MEANS OF CHUTE LAID DOWN HILL ON A 26% GRADE.

WATER WORKS OPERATION: RESERVOIR MAINTENANCE.

Collection of Sediment in Reservoirs and Methods of Removing It—Flushing Out, Pumping, Wheelbarrows and Wagons, and Dredges.

SEDIMENT.

In addition to the organic matter that is washed into the reservoir, there will almost always be more or less sediment brought into an impounding reservoir by tributary streams. This sediment may collect in enormous amounts so as to rapidly decrease the storage capacity. In addition, sediment may collect around the intake pipes or tower so as to interfere with the withdrawing of the water from the reservoir into the distribution system, or at least cause more or less contribution of sediment to the water so withdrawn. Streams draining a soil of gravel or coarse sand or a watershed that is adequately protected from erosion may carry so small an amount of sediment that it can be neglected for years at a time; while in other cases the streams may carry so much sediment that it will be necessary to dredge out the reservoir at intervals that it may retain its capacity. Kensico Lake, N. Y., collected silt to only about 3% of its depth in 23 years, while La Grange reservoir in California lost 50% of its capacity in 10 years. Beaver Dam creek, in North Carolina, brought down 12,000 cubic yards of sediment in one year from a catchment area of fourteen square miles that was denuded of trees.

Distributing reservoirs that receive water pumped from muddy rivers will of course collect sediment. For instance, a reservoir at Trenton, N. J., receiving water pumped from the Delaware river and which is about 700 feet long by 400 feet wide was found after twenty years to contain about 6,000 tons of mud and sand. Reservoirs receiving water pumped from some of the muddy rivers and streams in the south and in the Ohio and Mississippi valleys accumulate sediment much more rapidly than this.

The amount of sediment reaching an impounding reservoir in many cases can be reduced by the cultivation of trees or other vegetation on the catchment area. Another method sometimes employed is to build low dams along the streams which feed the reservoir, these dams serving as small sedimentation reservoirs to permit clarifying of the water. Or, if the topography permits, a low earthen dam may be built in the main reservoir a short distance from the mouth of the stream that feeds it, thus forming what is in effect a sedimentation basin at the upper end of the reservoir. If either of these methods of construction is employed, it is generally necessary to remove sediment from the small sedimentation basins at sufficient intervals to keep them effective; but silt can be removed from small sedimentation basins much more readily than from main reservoirs.

There are four general methods of removing sediment from reservoirs—flushing it out through a pipe or other outlet at the lowest part of the reservoir; pumping it out by use of a suction dredge or other method by which the sediment is mixed with abundance of water; dredging by means of buckets; removing by shoveling into wheelbarrows, carts, buckets swung from derricks, etc.

In the majority of cases removal by water is much the cheaper method, but this of course requires the presence somewhere in the vicinity of a stream or low spot into which the water carrying the sediment can be discharged. If the reservoir contains a blow-off gate or pipe, or if the distribution main leading from the reservoir is provided with a blow-off and the general conditions are such that it can be used for this purpose, washing the mud out by gravity through such outlet is the cheapest method of removal. Merely opening this outlet, however, will not secure the removal of sediment at any great distance from it, no matter how great the volume of water in the reservoir, since a velocity sufficient to pick up the sediment is not obtained by the water except at and for a short distance back from the outlet. It is therefore necessary to move the sediment from the various parts of the reservoir toward the outlet, and the use of more or less water is desirable for this also.

Where the reservoir is comparatively small, as in a distributing reservoir or a sedimentation tank, water can be used through hose, supplied from the pumping main by which the reservoir is filled or by a special portable pumping plant; the jet of water being played against the face of the sediment so as to wash it away as in hydraulic mining. As the face of the sediment recedes from the outlet, there is a tendency for the water that is carrying it out to deposit some of it, and to prevent this it is sometimes necessary to agitate the water to keep the sediment in suspension, or to push it toward the outlet by use of squeegees or wooden shovels similar to large snow shovels. In fact, where it is desirable to minimize the amount of water used, it may be preferable to use merely enough water on the sediment to soften it a little if it should be packed hard, and move it all to the outlet with large shovels operated by two to five men, using the stream of water to wash it through the outlet to the point of deposit. Another method of conserving water and preventing re-deposit of sediment is to provide a number of planks with cleats fastened to one side so that the planks can be stood on edge, using these planks to form the sides of channels in which is confined the water carrying the mud to the outlet.

Where the reservoir to be cleaned is a large impounding one, there will generally be sufficient water flowing in the impounding stream to serve for removing the sediment. Sometimes, if the amount available is not abundant, it is well to construct a temporary dam just above where the excavation is taking place, provided with a gate, so that the water can be dammed up for a short time and then released, thus furnishing a greater volume of flow than where the flow is continuous. In this case the original channel of the stream, which ordinarily will extend to the clean-out outlet, can be used for carrying the water and the sediment can be shoveled or drawn by scraper or otherwise into this channel. If the channel is filled with sediment it may be worth while to dig this out as a preliminary to the cleaning, or a channel can be formed by using the more solid matter in the sediment for forming banks for such channel. For bringing the sediment from points at some distance from the main channel, wooden flumes may be used, being extended by additional lengths as the excavation recedes from the main channel, the sediment being shoveled into the flume while water is played into it through hose from a portable pumping plant; the flumes being shifted from time to time to keep them near where the sediment is being shoveled up.

Ordinarily it is not necessary or desirable to remove the sediment below the level of the outlet of the reservoir, since when in service the reservoir will not yield any water below this level, and the deep water in such holes has practically no circulation and in time becomes foul with organic matter. If, however, the sediment in these low spots contains much putrefactive matter, this should be removed and it would be a good plan to fill the depressions with gravel or clean soil of any kind if this can be done at small expense, as perhaps by use of scrapers in leveling off near-by elevations.

In some cases reservoirs have not been provided with clean-out outlets, so that the method just described is not applicable. The sediment may then be removed by wheelbarrows or teams, a runaway being built at an incline up one side of the reservoir if the banks are steep. Or a drag-line scraper can be operated from the top of the bank. Or a portable centrifugal pump or other type suitable for pumping muddy water may be located in the bottom of the reservoir at the lowest point and the sediment washed or scraped to the suction of the pump and there diluted; the pump discharging the dirty water through a pipe over the bank of the reservoir and onto low land in the vicinity. In some cases the dirt has been removed by derrick, the buckets being filled in the reservoir by hand and emptied into carts on the top of the reservoir bank, by which the dirt is removed. This is practicable only for sediment that is coarse enough and solid enough to be shoveled. In fact, there may be near the inlet of any reservoir material so coarse that it is impracticable to remove it by water carriage, and some method of removal in bulk, as by cart, wheelbarrow or derrick, will be necessary.

CLEANING RESERVOIR AT TRENTON, N. J.
Sand being removed by derrick and bucket in the foreground. At the center, floating pump discharging mud through floating pipe line.

In any of these methods involving the use of water, where the reservoir is small and it is necessary to remove the sediment frequently (as in the case of sedimentation basins or reservoirs receiving very muddy water), it has been found worth while to build a water main, say six inches diameter, in the walls or banks of the reservoir and supply such main with hose connection at intervals of say fifty feet, so that lines of hose may be connected wherever wanted and water supplied under pressure at any part of the reservoir.

The methods described require the emptying of the reservoir and if there is not a duplicate reservoir, ar-

rangements must generally be made for continuing the supply during the cleaning by a by-pass around the reservoir or pumping directly into the mains. In some cases, however, there may be more than one distributing reservoir or the reservoir may be divided into two parts by a retaining wall, in which case of course one part is retained in service while the other is being cleaned. In the latter case water for flushing out the sediment may be obtained from the other half of the reservoir, either by means of a pipe or pipes passing through the division wall and provided with hose connection, or by means of a pipe carried over the division wall and acting as a syphon. In any case it must be remembered that volume of water for removing the sediment is as important as velocity of the jet for loosening it up.

In many cases it would not be permissible to draw off the water in order to remove the sediment, since, in the case of an impounding reservoir, it might require several seasons to fill it again. The sediment can be removed from such reservoirs by means of a suction dredge discharging the sediment through a flexible line of pipes carried on floats to the point of discharge; or a dredge using a clam-shell or other type of bucket, the dirt so dredged up being discharged into a scow. Washington, D. C., for instance, maintained such a dredge continuously in a reservoir which received a considerable amount of sediment, and used it for a total of several weeks each year. Dredging of course stirs up the sediment to a certain extent and muddies the water, but in the case of a large reservoir the effect on the supply is hardly noticeable. The effect of the suction dredge in muddying water is usually less than that of a bucket dredge.

Disposing of the sediment that is removed is sometimes even more difficult a problem than getting it out of the reservoir. Where it is flushed out by water, the water removing it is frequently discharged into the bed of the stream below the dam in the case of an impounding reservoir and is gradually deposited along the stream. Where this would be objectionable, advantage may be taken of some point below the reservoir where an inexpensive dam, only a few feet high, and possibly built of timber, will hold back the water in a basin which will permit a large part of the silt so removed to settle out. In such case, however, a flood which will send waste water over the spillway would probably carry considerable of this sediment on down stream. Where the topography permits, by building walls or bulkheads along the banks of the stream and discharging the sediment-bearing water behind such bulkheads, the sediment will settle behind these and gradually build up level areas of land that may be used for farming or at least will be above the reach of flood flow in the stream.

In some cases the sediment so removed may be used to advantage around the shore of the reservoir for filling in places that are so shallow that vegetation grows in them to the disadvantage of the water supply. By throwing up banks, using for this the heavier sediment, and discharging silt-bearing water behind these, such low spots may be built up or swamps may be filled in to the improvement of the reservoir. Sediment removed in carts may of course be used for the same purpose.

In the case of a small distributing reservoir or the sedimentation basin of a purification plant, the disposal of the sediment is frequently not so simple. Where there is no stream available in which to discharge the water, it may be necessary to remove all of the sediment by wheelbarrows, carts or derrick and place it in spoil banks or on land of little value in the vicinity. In the case of a sedimentation basin, this should be foreseen in the planning and provision made for the disposing of the sediment. Where the basin is located near a river from which the water supply is drawn, there generally is no objection to washing the sediment back into the river, since it originated there in the first place. Where, however, the basin is far removed from a stream, it may be best and most economical in the long run to construct a sewer of ample size and sufficient grade to conduct the sediment-carrying water to a satisfactory point of discharge. Failure to give sufficient attention to this point has, in a number of cases, resulted in a water purification plant becoming a nuisance to those on a lower level or further down stream, or has in a short time created a most serious problem for the operators of the plant.

The cost of removing sediment by flushing it out has varied in a number of cases from ½ cent to 5 cents per cubic yard. The cost of removing it by shoveling, according to figures from a number of plans, has run as high as 50 cents, although 30 cents would probably be more nearly the average. When dredges are used, the depreciation and upkeep on the dredge or cost of getting it to and from the reservoir would probably be the chief item, unless the amount of silt deposited required almost continous dredging; the cost per cubic yard, therefore, would depend very largely upon the amount removed.

HEATING BY ELECTRICITY.

Presentation of Principles of Heating Residences, Which Prove the Impracticability of Ever Employing This Agency in General Practice.

The coal shortage of the past year or two has given renewed interest to the possibility of heating houses by electricity, especially because of the fact that in many sections of the country electric current can be generated in large quantities by water power. A report on this subject by the Hydro-Electric Power Commission of Ontario is therefore timely.

The commission apparently proves that there is no probability that houses will ever be heated electrically, unless in southern climates where only a little heat is required. The difficulties are (1) The enormous amount of energy that would be required and which could be applied more efficiently to other purposes; (2) The high cost as compared with other methods of heating.

Assuming an 8-room house, using 9 tons of anthracite coal during the winter for heating, as representing average conditions; and coal yielding 12,500 B.t.u.; then this house uses on the average the equivalent of 17.5 h.p. But the coldest days would probably demand a rate of coal consumption 50 per cent above the average, or equivalent to 26 h.p. Assuming that 40 per cent of the heat generated is not effective in heating the house but goes up the chimney, then the useful house power would be 10.5 on the average, or 16 during the coldest weather.

Electricity may be considered as 100 per cent efficient in furnishing heat; hence, if a house is heated by electricity there would be required a maximum equivalent of 16 h.p., or an average of 10.5 h.p. This average would amount to 52,920 h.p. hrs. for the entire winter. Since a kilowatt equals 1.34 h.p., this equals 39,700 kw. h. At 3 cts. per kw. h., this would give the cost for heating for the winter $1,191. At the low rate of 1 cent, the cost would be $397. "Power" rates as charged for current from Niagara Falls, Ontario, the cheapest in Canada, would make the cost $140. But since the current would

be used almost exclusively in the winter, and the peak load for every service would come at exactly the same time—the coldest days—it is doubtful if so low a rate as this could be granted for heating.

Since, at a cost for anthracite coal of even $10 a ton, the furnishing of heat for the assumed house would cost only $90, it would seem to be improbable that many would be willing to pay the difference for electric heat. The commission calculates that with the low rate of 0.35 cent per kw. h. for electricity, the price of coal would have to rise to $15.50 a ton before it would cease to be the cheaper.

Another consideration is the amount of hydro-electric power available. Niagara Falls is the largest single source of water power in the country, and the total power developed there would not suffice to heat the homes of the City of Toronto alone. It is, of course, out of the question to think of using coal for generating electricity for heating if hydro-electric power is too expensive.

Still another consideration is that of conservation. Under the most favorable conditions, not more than 12 to 15 per cent of the total theoretical energy in fuel can be converted into mechanical power; while in heating, 50 to 60 per cent of such energy is utilized. In the case of hydro-electric power, however, 60 per cent or more of the theoretical energy can be utilized in the form of mechanical power. Conservation of both sources of energy therefore demands that hydro-electric power be used for mechanical purposes and coal for heating.

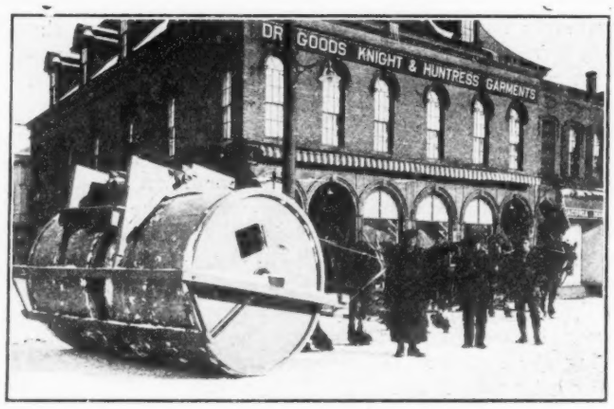
An exception is noted by the commission as follows:

"The use of electric heaters, however, as auxiliaries to other systems to warm up an otherwise cold room or during chilly periods in the spring and autumn when the furnace is hardly needed will prove in very many cases a great convenience; and, provided that the periods of use be short, e.g., for an hour or two in the morning or evening, it will be almost as economical to use electric energy in this manner as to light a fire in the furnace, and very much less trouble."

For general heating, however, the commission sees no possible chance for electricity taking the place of coal.

SNOW ROLLING IN LACONIA.

It is impracticable to remove snow from all the streets of a city, although it is necessary to remove it from street railway tracks, and most desirable to do so from the entire roadway where such tracks are located. But in northern cities and villages, where snow collects to a considerable depth during the winter, streets may be almost impassable if something is not done, and many of these compact the snow by rolling, this being especially advantageous because of the general use of sleighs in these sections.



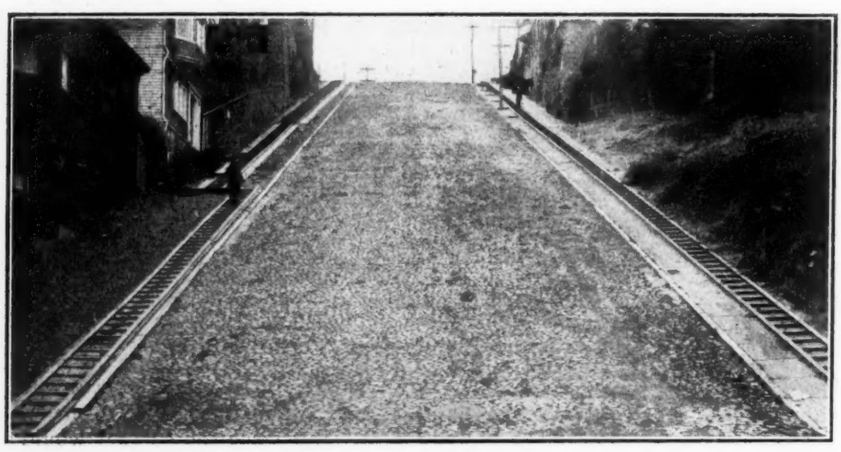
SNOW ROLLER USED BY LACONIA, N. H.

Laconia, N. H., has for several years used the kind of snow roller shown in the illustration, four having been in service last winter. This roller is 6 ft. 4 in. in diameter and each half is 5 ft. long. The weight is 4750 pounds. When the snowfall is not too deep the roller can be drawn by four horses, although six are often used. The sidewalks are cleared with wooden sidewalk plows and the piles along the curb are then spread onto the roadway with a road scraper mounted on runners, and then rolled with the snow roller. In cold weather, four-ton motor trucks can be driven over the rolled roads, but this is not practicable during a thaw if the snow is deep.

In breaking out country roads the roller is used if the fall exceeds 4 inches, or even for lighter falls if the road is drifted. One man drives the four or six horses and other men are sent ahead to shovel when drifts are encountered, and to level off humps and holes. The roller then passes over and compacts the surface so that it will hold a team. Six horses and three or four men will cover an average of 12 to 15 miles in a day of nine hours. The average cost is about $1.40 per mile, although this varies with the character of the snowstorm.

If the roads are rolled after each snow or wind storm, they will build up in cuts where drifts form, so that finally no more drifting occurs there. Also, on spots where the snow blows off and leaves the road bare, the rolling compacts the snow and maintains the road in good shape for sleighing. In many places excellent roads for sleighing are made over drifts 6 to 8 feet deep which otherwise could not be used without shovelling. In the spring, when the snow softens, some of the deeper drifts have to be cut out with the road machine.

The above information was furnished by Charles A. French, city engineer and street commissioner of Laconia.



STEPS UP SAN FRANCISCO SIDEWALKS.

On several of the steep streets in San Francisco wooden steps are built on the sidewalks, as shown in the photograph. In most cases where these steps are provided, the pedestrian can use either them or the smooth sidewalk, whichever he may prefer. Generally the steps are preferred to the sidewalk by a large majority.

The roadway in this illustration is paved with cobblestones. This type of pavement is being replaced with brick.

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INCREASING MUNICIPAL REVENUES.

Most of the cities of the country that are not already "dry" derive an appreciable part of their income from liquor licenses. In some this revenue was not large, but in others it amounted to 15 per cent, 20 per cent and even 23 per cent of all the tax receipts. After this year this source of revenue will be cut off. In addition, the general trend of municipal expenses for years has been upward. There is, therefore, presented to most cities a serious problem that requires immediate attention—the increasing of the annual revenue for paying operating expenses. Certain municipal reports and results of investigations suggest the question whether new sources of income are needed, or whether an increase sufficient for some time to come cannot be obtained by a more thorough use of the present sources.

Investigations in certain small communities near New York recently revealed that in one municipality a piece of property containing thirty acres had been paying taxes on an assessment on eighteen acres; that property lying in two towns had been assessed in neither; that one large piece of property had not appeared on the assessment list for fifty years, and other similar omissions. Those who have made even superficial investigation of such matters will probably agree that there are few cities or towns where some such omissions cannot be found. There is only one way by which such conditions can be entirely remedied and this is by preparation and use by each municipality of an accurate assessment map on which every square foot of land within the taxable limits is represented, and accounting for every piece of land on the map each year as either paying taxes or as exempted from payment for legal reasons definitely stated.

The matter of exemptions is one that should be looked into carefully and given full publicity. We believe that if it were definitely stated to the tax-payers that, by removing the exemptions in their city, their individual taxes could be decreased by 10, 15 or even 25 per cent, there would be immediate demand on their part for a considerable reduction in the amount of property exempted.

The matter of uncollected taxes is one that demands drastic action. We venture to assert that there are many cities in which there is no record that is at all reliable of the amount of taxes remaining unpaid from previous years, and in a great many there are no means of obtaining legal evidence for the collecting of back taxes; while there are few cities that have exhausted their resources provided by law for collecting back taxes. We believe that if all taxes that are assessed should be collected except those that have been remitted for cause, an appreciable addition would be made to the income of most cities.

It is always easier to pass new laws than it is to enforce old ones, and there is a general tendency at the present time to rush to the legislature with bills granting cities additional means for providing revenue. Probably in some cases new sources of revenue must be devised before long, but in the meantime it would be much safer to enforce laws which have been tried out than to make experiments, the results of which remain to be proved.

TECHNICAL ARTICLES CENSORED.

A censor has been established over United States periodicals, and in accordance with his instructions we shall in the future omit certain items of information that it has been our practice to give in connection with our descriptive articles. We make this explanation to forestall inquiries by our readers as to why such omissions are made.

The Post Office Department, by the new postage rate law, is required to classify all the matter that appears in periodicals as either advertising or not advertising. In making this classification, it has decided that the naming of the manufacturer of or dealer in an article is advertising. Thus, if in an article describing concrete paving we should state that the cement used was furnished by the Beta Cement Company, or that the expansion joint material was made by the Tarrett Company (we can not use real names or this editorial would probably be classed as advertising matter), that makes the description advertising matter. Or if we reproduce a photograph of the mixer and state in the caption under the cut that it is a Keyring Machine Company mixer, that is advertising.

Engineers and contractors quite naturally desire to know what kinds of materials and equipment are used on difficult pieces of work, and we will be glad to furnish this information by letter to any who will write asking for it. Unless the ruling is modified or the law repealed, however, we will have to omit them from our non-advertising pages in the future, as otherwise we would have to pay for them the higher postal rates charged for advertising matter.

TO THOSE DESIRING ENGINEERING SERVICES.

A number of engineers who have been serving in the army or in government capacities during the war are about to be released from their present duties. It is the desire of the several national engineering societies to place these engineers in touch with contemplated projects as early as practicable.

State and municipal authorities, corporations and individuals who now have, or expect in the near future to have, need for the services of professional engineers are requested to immediately communicate their wants to the Engineering Societies' Employment Bureau, 33 West 39th street, New York City. This bureau is maintained by the four national societies of civil, mining, mechanical and electrical engineers.

The engineers that are now or soon will be open for engagements include many of the highest grade, and probably no better opportunity has ever occurred for securing just the kind of men wanted by cities, states or private companies.

The WEEK'S NEWS

Propose $50,000,000 Road Bonds for Michigan—Masking vs. Influenza in San Francisco—Financing City Hydro-Electric Plants in Los Angeles—Gas Company Fights New York 80-Cent Law—Fires in Dodge City, Ia.; New York, N. Y.; Pittsburgh, Pa., and West Warwick, R. I.—Permissive Legislation for Commission and Manager Government in Indiana—War Increased City Costs in New York State—Philadelphia's Mayor Not Guilty in Fatal Election Fight.

ROADS AND PAVEMENTS

$50,000,000 Bond Issue Proposed for Michigan.

Lansing, Mich.—Without a dissenting vote the state senate has passed a resolution introduced by senator William M. Connelly, Ottawa, for submission to the voters of a constitutional amendment giving the state authority to issue bonds up to $50,000,000 for the construction of paved roads in Michigan. It is the plan to have this proposed constitutional amendment submitted to the voters at the spring election if the joint resolution passed in the senate is acted on favorably in the house. Proper legislation to provide for carrying out the road paving program if the amendment is indorsed by the people is already under consideration. Senator Connelly states that it is no part of the plan to have the state take over any road except the trunk line system, which at present includes about 4,800 miles. He points out that the federal government is already inaugurating a national commission to carry out the government's work, the state will supplement this by the plan suggested for control of trunk roads, and the remaining tributaries will be left in the hands of the counties and townships, making one co-ordinated and efficient system for road construction.

To Build New Bridge.

Milwaukee, Wis.—After many years of effort, marked by bitter litigation, the new State street bridge, to replace the present span, will be constructed this year. Efforts of the city to procure a small strip of property have been hard fought, the case having been carried to the supreme court. This difficulty, however, has been amicably adjusted and a condemnation jury has acted favorably upon the acquirement by the city of the needed property. The new State street bridge will cost $250,000, exclusive of any sum involved in the real estate to be purchased. It will consist of two movable leaves, 116 feet between trunnions, and will have concrete and steel approaches at each end, providing a ninety-foot clear channel for navigation. The structure will carry a forty-foot roadway and two walks ten feet in width. The present structure, condemned, is a latticed swing bridge. It was erected in 1871. It has only a sixteen-foot roadway and walks less than six feet in width. Plans for the new bridge are now being completed by superintendent David McKeith of the department of bridges and buildings.

Suggests State as Contract Surety.

Albany, N. Y.—Discontinuance of the practice of having contracts for the department of highways guaranteed by security companies, and development of a plan whereby the state could insure its own contracts, are suggested by highway commissioner Edwin Duffey in his annual report. The commissioner told of a practice which had grown up, under which contractors without prior experience and sometimes without financial resources were provided by a surety company with a certified check necessary to bid. If such a contractor proved to be the low bidder he received the contract and the surety company wrote his bond. Several contractors, most of whom had obtained contracts with the aid of the surety companies, abandoned their work when war conditions raised the price of labor and materials. Others continued the work, but in an unsatisfactory manner. In some cases surety companies obtained injunctions restraining the department from compelling the completion of contracts on the ground of impossibility of procuring labor and materials. "It would seem," the report says, "that a plan could be evolved by which the state could insure its own contracts and thus receive the protection for which payment is made." The report states that in 1915, the last year when normal conditions prevailed, contracts were awarded for the improvement of 1,073 miles of highway at a cost of $11,790,000. At the present price of labor and materials little more than half that mileage could be completed for the same money.

SEWERAGE AND SANITATION

Influenza Decrease Follows Compulsory Masking.

San Francisco, Cal.—After five days of compulsory masking throughout the city, for the second time, health officer William C. Hassler announced that the situation was once more under control. He said: "The danger remains, however, of a sudden flare-up through contact with visitors from areas where the disease is not under control, and for this reason I deem it advisable that the masks continue to be worn, even though the local epidemic appears to be eradicated." For the five days before and five days after the masking order went into effect, the official record of new cases and deaths was as follows:

	New cases.	Deaths.
January 15	510	50
January 16	538	42
January 17	519	39
January 18	412	25
January 19	400	16
*January 20	366	40
*January 21	183	22
*January 22	164	15
*January 23	118	11
*January 24	85	20

*Masks on.

On the first day of required masking, 186 persons were arrested for violation. Masks must conform in construction and method of wearing with the regulations. The state board of health has argued that the value of masking has not been proved. Dr. W. H. Kellogg, secretary of the state board, based this view on mortality charts showing that the peak of the epidemic and the fall in most cities had been the same whether the mask was worn or not, and regardless of the closing of schools, theatres, etc. He insisted that any chart based on the number of cases was not reliable, because all the cases never were reported, while deaths had to be. He said everybody was at a loss to tell where the influenza came from or how it could be controlled, and hence the state board did not feel justified in recommending the enforced use of the mask. He attributed the apparent drop in cases after the mask was put on to the deceit of the doctors. He said the latter unconsciously were anxious to see the mask enforced, so reported many cases as bad colds and not influenza as they had been doing. It was a psychological effect, he said. When the masks would be renewed, the doctors would start faithful reporting again. "The progress of the influenza," said Kellogg, "has been shown by comparisons to be uniform, self-influencing and self-limited.

The length of time has been the same in all cities, despite various preventive measures used. I don't say the mask is no good, but there is no proof of individual benefit accruing from its use. I will admit the theoretical benefit and would wear a mask myself in treating cases, but there is nothing to show its forceful use has done any good. If found good, the state board will be the first to get behind it." Health officer Hassler said that while the mask may not be 100 per cent. perfect it was worth using if it were only 50 per cent. perfect and helped reduce the epidemic. He traced the epidemic in San Francisco, how it reached its peak on October 23 and fell off immediately upon the enforcement of the mask. It flared up again after the New Year's celebration, after the mask had been taken off, and is being reduced now by the return of the mask. "The rise and fall of the influenza in October in San Francisco and other cities may have been a coincidence, as Dr. Kellogg suggests," said Hassler, "but there is no coincidence about the present situation in San Francisco. The mask has a definite value in that it is a preventive in assemblies of people and where influenza carriers are mingling with crowds." The attitude of the state board is encouraging the Anti-Mask League, which seeks repeal of the masking ordinance by "lawful means."

More attention is being paid to reporting of cases by physicians. In Los Angeles, a doctor was arrested and fined $10 for failure to report a case of pneumonia. Health commissioner L. M. Powers has warned that the full $50 fine will be administered hereafter.

"Health Sunday" Postponed.

Washington, D. C.—Because the committee having charge of the Theodore Roosevelt memorial services has designated Sunday, Feb. 9, as the day on which this memorial should be nationally observed, it has been necessary for Surgeon General Rupert Blue of the United States Public Health Service to ask that the date for "Health Sunday" be changed to the last Sunday in February—the 23d. Sunday, Feb. 16, is to be devoted by the leading churches of the country to raising a fund of several millions of dollars for social reconstruction work. Already many of the leading pastors of the country had signified to the surgeon general of the United States Public Health Service their intention of holding specially arranged services in support of the nation-wide campaign now being carried on by the division of venereal diseases under Assistant Surgeon General C. C. Pierce for the suppression of prostitution and the prevention of venereal disease. These plans will all be transferred over to Sunday, Feb. 23. Surgeon General Blue has asked all the ministers of the country to "urge upon their people the timeliness of a campaign for civic cleanliness, both physical and moral, in view of the expected return of the men and women who went out to make sacrifices in the great crusade for righteousness and freedom."

Venereal Disease Campaign Includes Treatment.

Billings, Mont.—A report has been sent to Surgeon General Blue of the U. S. Public Health Service at Washington, describing the work of the venereal disease clinic being carried on under the direction of Dr. Louis W. Allard. The isolation and treatment of prostitutes in Billings was instituted September 20, 1918. As soon as the free clinic was opened the police department brought to the health office all of the known prostitutes then in the city; 32 women were thus brought in and examined; a few of these girls were found to be employed in legitimate business and they were allowed to continue this provided they complied with certain rules laid down by the health department, the principal one of which was that they were to report at stated intervals for treatment. Their addresses were all recorded, and in most cases their home conditions inspected. In connection with the clinic a homelike, well-furnished detention home has been established, sufficient to accommodate fifteen cases at a time. This is under the direction of a trained nurse, and many of the girls placed in this detention home are permitted to do day labor, reporting at night, when they receive treatment and occupy their rooms at the sanitarium.

STREET LIGHTING AND POWER

Financing Second Plant with Profits from First.

Los Angeles, Cal.—The city council has approved the recommendation of the public service commission that the city's surplus revenue, in the present fiscal year, from the sale of electric power shall be applied, "so far as practicable, to the construction of power plant No. 2, and works incident and appurtenant thereto." In the past fiscal year the surplus revenue was applied to the payment of the principal and interest of electric power bonds, thus reducing the city tax rate 8½ cents. It will take the surplus revenue of two or three years to finish power plant No. 2. The city has already expended over $1,250,000 of bond funds and other money for preliminary construction and special tunnels required in connection with this plant. The water of the aqueduct, on its way to this city, after passing through power plant No. 1, passes by the site of proposed power plant No. 2 where continually, day and night, it makes at present a useless drop of 530 feet. For the past year, the Municipal League has consistently urged the city government to take the action that it has now taken.

Power Plant Census.

Washington, D. C.—Preliminary figures of the forthcoming quinquennial report on the central electric light and power stations of Delaware, District of Columbia, and Maryland have been given out by Director Sam. L. Rogers, of the Bureau of the Census, Department of Commerce. They were prepared under the supervision of Eugene F. Hartley, chief statistician for manufactures. The statistics relate to the years ending Dec. 31, 1917, 1912 and 1907, and cover both commercial and municipal plants. They do not, however, cover electric plants operated by factories, hotels, etc., which generate current for their own consumption; those operated by the federal government and state institutions, and those that were idle or in course of construction. The number of establishments reporting increased from 56 in 1912 to 63 in 1917, a gain of seven, four of which were commercial and three municipal. During the same five-year period the income increased $3,803,905, or 70.6 per cent., as compared with an increase of $2,040,675, or 61 per cent. from 1907 to 1912. Steam power in 1917 formed 97.9 per cent. of the total for all classes of power, and a noticeable feature of these statistics is the steady increase in the capacity of the steam engines and turbines used. The average horse power per unit increased from 565 in 1907 to 997 in 1912, and to 2,702 in 1917. The increase in the output of stations from 1912 to 1917, amounting to 208,404,896 kilowatt hours, is significant of the growth in the business of the electric stations.

Wants Legislative Gas Price Declared Unconstitutional.

New York, N. Y.—The Consolidated Gas Company, in a suit begun in the Federal District Court, asks that the 80-cent gas law enacted by the Legislature several years ago be declared invalid because it is unconstitutional, on the ground that it is confiscatory of the company's property. The company says that for the year ended Oct. 31 last its net income was only $99,241.65, or less than ¼ per cent on its investment of $69,697,700, exclusive of good will and other intangibles. A temporary injunction is asked to restrain the attorney general of the state, the district attorney, and the public service commission, the three defendants, from taking any measure to enforce the 80-cent law. In its complaint the company offers a mass of figures to show lack of income to pay charges. Its gross operating revenues for the year ended in October, it says, was $15,764,288.11, while the cost of manufacturing and distributing the gas, including taxes and other expenses, was $15,665,046.46. Its net income of $99,241.65 represents a 6 per cent return upon only $1,654,027. Reference is made in the complaint to the decision of the United States Supreme

Court in 1909, when the first suit was dismissed, which was, in brief, that although a return of less than 6 per cent upon the value of the property employed would be confiscatory, and that while the lower courts found that the return at that time was less than 6 per cent, the margin "between possible confiscation and valid regulation" was so close that it failed to show clearly that a charge of 85 cents for gas would not yield a fair and reasonable return. The company says that at no time since this decision was rendered has it earned as much as 6 per cent. Since the statutory rate has been in effect, the company says, there has been a steady deficiency which now aggregates at least $12,000,000, which should be added to the value of the property and upon which a return should be allowed. Then the complaint says: "Since Dec. 31, 1906, there has been $14,085,265 added to the value of the company's property devoted to its gas business which was valued by the United States Circuit Court in the former suit at $55,612,435. The cost of reproducing the property at the present time would greatly exceed $69,697,700. A return of only 6 per cent upon the investment would amount to not less than $4,181,862 per annum. The net earnings of $99,241.65 for the year ended Oct. 3, 1918, amounted to only 55-100 of 1 cent a thousand cubic feet of gas sold." It is claimed that the deficiency is caused directly and solely by the "arbitrarily restricted price" at which the company is compelled to sell its gas. The company's average daily sales are stated to amount to 62,728,800 cubic feet, which makes the daily loss $14,264.53, which is rapidly swelling the deficiency in the company's earnings. The complaint sets forth the various items needed in its business which have grown so greatly in cost as well as the large increases in wages, and the greatly depreciated value of money, which makes the purchasing power of a dollar not more than about 60 cents. In a suit by the Brooklyn Borough Gas Co. last year for permission to raise rates Charles E. Hughes, who was governor of the state when the law was passed, was named as the referee with all powers of a court. He held that the eighty-cent rate was confiscatory, but made no recommendation.

FIRE AND POLICE

Fire Destroys Almost Whole Town.

Dodge City, Ia.—A spectacular fire, which started in early morning, swept through and almost destroyed the town, causing a loss of $100,000, which is only partially covered by insurance. The fire started in the rear of a pool hall. The flames then spread rapidly in spite of the efforts of fire crews from Camp Dodge, who played steady streams of water upon the fire for nearly six hours. The buildings were constructed of wood and plasterboard and burned rapidly. The ruins were still burning late in the day, and twice during the day the fire departments were called again because the blaze threatened what was left of the little city constructed on the hill east of the camp where the cantonment was first built. Practically all that remained of the town was the hotel and two small buildings. No one was injured during the fire. A $50,000 theatre was among the buildings burned.

Hundreds Fight Big Fire at Aviation Station.

New York, N. Y.—A fire, which started from the explosion of a gasoline torch in the hands of a workman, destroyed two buildings and threatened for a time to wipe out the Naval Aviation Station at Rockaway Point. The property loss was heavy, some persons asserting that it might reach $1,000,000. Two buildings valued at $60,000 each were destroyed, twenty-five Liberty motors were wrecked beyond repair, and eight modern equipped hydro-airplanes and quantities of oil and other supplies were burned. The fire was fought by 1,500 men from the aviation station and from Fort Tilden. The fire started at 10.30 o'clock in the morning when the gasoline torch, used in making some repairs in the Construction Building, exploded. The burst of flame caught in some linen used for wing covering, and in a few minutes the building, 100 by 100 feet, was spouting flame. In the building were nine hydro-airplanes. By quick work, men succeeded in wheeling out one before the fire reached it and this was the only thing in the building that was saved. The alarm of fire brought Ensign Ahearn and a great force of men. Their work was confined to saving property and preventing the spread of the fire by the use of water, sand, and ashes. They worked under great difficulty and in constant danger, for the wind sent the flames trailing at a great distance. Alarms brought the fire department apparatus from the Rockaways to the aviation field. There was insufficient water, and until a steamboat arrived the firemen had little hope of saving the camp. The engines of the boat pumped water, and in less than an hour after the boat arrived the flames were well under control. About 400 sailors formed a brigade and passed buckets from Jamaica Bay to a 5,000-gallon tank of gasoline which was near the danger area. Sailors poured water from the buckets on the sand, and a shovel squad in turn piled the wet sand on the tank. It was saved from destruction. One hundred feet from the construction building was a hangar in which were several airplanes. Stored between the buildings were about two hundred barrels of gasoline, which a large force of men started to roll into Jamaica Bay. While they were at this task, the flames leaped the intervening space and caught the hangar. Under this canopy of fire and in a shower of sparks the men continued to work. They succeeded in rolling nearly all the barrels of gasoline into the water before the intense heat drove them away. The energy of the volunteer fighters and a shift in the wind saved the other buildings. The volunteer fighters saved some fifty machines in all.

Fire Sweeps Crowded Tenements.

Pittsburgh, Pa.—Damage estimated at $90,000 and the destruction of the most thickly populated tenement square in the city, resulted from a fire which originated in a paper box factory and destroyed neighboring machine works. Thousands of Italians, Greeks and Syrians were driven in scurrying droves from their tenement homes. At 9.45 a triple alarm sent all the downtown fire companies into action on the pocket of closely packed four-story brick structures bounded by Epiphany street, Bedford avenue and Bigelow boulevard. A call by fire chief Bennett caused all the northside and southside companies to move in, and before 10 o'clock water was being poured into the furnace by a large number of engines than have attended a fire within recent years. The spectacular scene was set on a hillside and looked like a fiery drama on a mammoth stage and the audience was the thousands in the valley and on adjacent hills. The wind at 30 miles an hour fanned the embers, and every part of the blaze brought under control had to be watched. These frequently caught the flame again and occupied the attention of several companies. No lives were lost.

Many Towns Respond to Big Mill Fire.

West Warwick, R. I.—The Royal Mill in Riverpoint, West Warwick, one of the largest cotton textile plants in the Pawtuxet Valley, has been destroyed by fire with a loss of approximately $1,250,000. The fire started about 9 o'clock in the evening in the upper part of the 276-foot memorial tower, which rose from the front of the mill near its centre. When first observed, it was a slight blaze, and men with buckets of water undertook to extinguish it. It was at first thought that they had succeeded in doing so, but the flames broke forth again, and at a height which could not be reached with any water power available. The combined efforts of fire companies called from Phenix, Warwick and Coventry, Cranston, and one motor company from Providence failed to check the flames. The firemen kept the mill buildings drenched, and it was first thought that the fire might exhaust itself within the tower by consuming the relatively small proportion of woodwork in it. The upper third of the tower, however, was principally of timber construction, and this toppled

over upon the roof of the big main building and crashed through the two upper floors of the six-story structure. The flaming mass of timbers spread blazing embers in all directions through the two floors, and then the fire ran throughout the immense plant in such volume that there was no possibility of the fire fighting forces combating it within any measure of success. Before midnight it was apparent that nothing could be done to save the establishment, with its 48,000 spindles and 1,200 looms from utter destruction. In another hour the flames had reached every part of the six floors from roof to basement and the side walls were falling in. For a time it looked as if the entire village of Riverpoint might be wiped out, as masses of burning cotton rose from the mill and were blown on to the roofs of the Riverpoint store and other buildings near by. In several instances the firemen were called to put out small blazes in various sections of the village, often at distances exceeding 500 feet away from the burning mill. An explosion of boilers in the engine room, shortly after midnight, drove the flames toward the four-story ell at the westerly end of the big structure. This contained a large quantity of paints and a roller shop. The ell is adjacent to a large number of wooden mill tenements, the nearest one being only a few feet away. The street is narrow at that point and on the opposite side are scores of other dwellings. The firemen feared that if the flames spread into the ell, and at first it seemed like a superhuman task to prevent this, many of these wooden houses would ignite and result in wiping out that end of the village. The firemen, however, were successful in stopping the fire at that point.

GOVERNMENT AND FINANCE

Commission and Manager Forms in New Bill.

Indianapolis, Ind.—A bill to give cities in Indiana the right to adopt commission or city manager form of government has been introduced by Capt. James E. Southard, representative from Laporte county. As this is a Republican platform measure and recommended by governor Goodrich in his legislative message, it doubtless will be enacted. Where the city manager plan is adopted the five commissioners draw nominal salaries and employ a city manager, who shall have charge of all the city's activities. As the bill is drawn it provides that the city manager need not have been a resident of the city or state. An effort also is made to have him chosen for fitness. On May 1, of any year, upon petition signed by 15 per cent of the qualified voters of a municipality, a special election would be called by the mayor of the city for determining whether the voters desire to change from the present to the commission or city manager form of government. Within five days after receiving the petition, the mayor would be required to order the election to be held on a date set between thirty and sixty days thereafter, according to the bill, which is similar in context to the one that failed of passage at the last session. The expense of the election would be paid out of the municipal funds. If the majority of the voters were opposed to a change another election could not be held within the next two years. If the change was authorized five commissioners would be elected. Two would serve for two years and three for four years. Thereafter they would be elected to four-year terms, the elections being held biennially. These commissioners would elect a mayor, who would head the department of safety, preside at the commission meetings and who would have a vote on all questions before the commission, but would not be authorized to veto any ordinance. Municipal laws could be enacted only at legislative sessions of the commission. The right of referendum would be given the voters for approval or rejection of all ordinances enacted by the commission. The salaries of commissioners elected in first class cities would be $5,000 annually; in second class cities, $3,000 annually; in third class cities, $2,000 annually; in fourth class cities, $1,500 annually, and in fifth class cities, $1,000 annually. The mayor would receive 2 per cent additional to his salary as a commissioner. Bonds would be required of the commissioners for faithful and honest performance of duty. The work of the administration would be divided into departments of safety, finance, utilities, parks and public works. The fundamental laws for conducting these departments are provided in the measure, which also sets forth that many existing laws would continue in force, as they relate to the administration of public work. There would be three classifications of employes, the competitive, non-competitive and labor classes. Rules for the employment of persons in the classified service would be promulgated by the civil service created by the bill, for the purpose of assuring employment of persons who merit places by virtue of their efficiency, character and industry. They would be on probation the first six months of their employment. No employee could be discharged for his or her political or religious views, and none of them could take part in politics lawfully, while employed in the public service. The unclassified service would include the commissioners, city manager, if one is employed, city clerk, city attorney, and certain deputies and secretaries whom the commissioners could appoint. Employment of a purchasing agent also would be authorized. The measure provides that in cities where city managers are employed his responsibilities would include the seeing that all laws are enforced, appointing or removing all directors and employes, directing and controlling the work of the commissioners.

War Increased Municipal Costs.

Albany, N. Y.—A big increase in expenses and a decrease in the revenues of the cities of the state are shown in a recent report by the State Bureau of Municipal Information. The report says that mandatory legislation and the war have been responsible for an increase of over $4,300,000 in the cost of municipal government in this state this year, exclusive of New York City. Revenues have decreased because of the loss of the excise tax and tax exemptions granted by the state. The report gives eight main causes for the increase in the cost of city government. They are: Increase in population, increased or expanding functions, general rising cost of municipal government, increase in the number of voters, operation of the Fenner law, workmen's compensation insurance, high cost of living, and increased interest rate. The cities, with the exception of New York, last year spent $53,249.39 for compensation insurance. The Fenner law, which requires municipalities to pay to a city official or employe in the military or naval service the difference between his federal and municipal pay has cost the cities, with the exception of New York, $688,886.21 this year. Because of the increase in the number of voters all cities, with New York City excepted, have had to appropriate $303,230.21 more for elections this year than they did in 1917.

Philadelphia's Mayor Acquitted.

Philadelphia, Pa.—Mayor Thomas B. Smith, the last of the principal figures to be brought to trial in the Fifth Ward political row which resulted in the killing of a policeman at the primary election in September, 1917, has been acquitted by a jury of the charges of misdemeanor in office and conspiracy to violate an election law which prohibits city office-holders from taking an active part in politics. The mayor was on trial nine days, and the jury was out less than two hours in considering its verdict. Surrounded by friends and members of his cabinet, the mayor shook hands with the jurors and wanted to address them, but the court said it was not necessary. The Fifth Ward row resulted over the election of a city councilman which office carried with it the ward's leadership. Mayor Smith was alleged to favor Isaac Deutsch, and was accused of using police to swing the election and of failing to protect voters by taking no action to prevent the bringing of New York gunmen into the war. The New York gunman who slew the policeman is serving fifteen years in the penitentiary, and several others brought from New York received shorter terms. Deutsch and a number of policemen are under sentence of from one to two years on charges of preventing a fair election. They are out on bail pending an appeal to the higher court.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles or any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on muncipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND STREETS.

Planning:

Width of Provincial Highways. The Department of Public Highways has been authorized to assume, construct and maintain a system of "provincial highways" in Ontario; roads must be widened to meet modern requirements. 5 illus., 1,700 words. Canadian Engineer, January 9, 15 cts.

Necessity for the Proper Location of Roads. Things to note in locating a road. By A. Dennis Williams, chairman W. Va. States Roads Commission. 800 words. Canadian Engineer, January 2. 15 cts.

Regrading Hillside Streets. Readjustment of grades on steep hills in San Francisco opens up inaccessible building sites and increases property values. By Chas. W. Geiger. 2 ills., 700 words. Good Roads, January 25. 10 cts.

Cost:

Cost of Road Work in New England in 1918 50 to 100 per cent. higher than in the previous year. From a paper by Col. William D. Sohier, read at the meeting of the Association of State Highway Officials. 800 words. Engineer and Contracting, January 1. 15 cts.

Road Material Prices for the 1919 Season. Survey of the field indicates little change in existing level with slight decreases possible in some lines. 600 words. Good Roads, January 4. 10 cts.

Construction:

Rapid Road Construction Under War Conditions. Two interesting cases were described by Mr. Clinton Cowen, state highway commissioner of Ohio, in a paper presented at the Chicago meeting of the American Association of State Highway Officials. 500 words. Engineering and Contracting, January 1. 15 cts.

Labor for Soldiers on State Highways. Figures collected by the bureau of public roads of the U. S. Department of Agriculture, indicating the probable number of returned soldiers and sailors that can be used during 1919 in road construction and repair work. 300 words. Municipal Journal, January 25. 10 cts.

Day Labor, Force Account Work and Bonuses on Highway Construction. Contract system more economical than day labor; conditions unfavorable to day labor; advantages of bonus system. 2,500 words. Municipal and County Engineering, January. 25 cts.

Convict Labor in Road Construction in West Virginia. Data on the maintenance of the prison camp near Charleston, in 1917, given by A. D. Williams, chief engineer of the W. Va. State Road Commission, in a paper presented before the American Association of State Highway Officials. 600 words. Engineering and Contracting, January 1. 15 cts.

Machinery:

Utilizing More Mechanical Devices on Road Construction. Necessity of saving in the cost of labor; use of labor-saving mechanical devices in Michigan. By Frank F. Rogers, state highway commissioner, Lansing, Mich. 2,800 words. Municipal and County Engineering, January. 25 cts.

Steam Shovel Practice. Methods now used are the development of a quarter century; economy of operation dependent upon various practical elements; mechanical ability, good judgment and experience are essential to the effcient operator. By Capt. Llewellyn N. Edwards, supervising engineer of bridges, Toronto. 6 ills., 3,600 words. Canadian Engineer, January 9. 15 cts.

Road Contractor Successfully Employs Charging Bins to Eliminate Dumping and Wheeling on Subgrade in Concrete Road Construction. Advantages of bin method over dumping on subgrade. By Geo. A. Burley, R. D. Baker Co., Detroit, Mich. 2 ills., 1,800 words Municipal and County Engineering, January. 25 cts.

Operating Cost of Tractor, Trucks and Sand Screen and Loader in Road Maintenance. Interesting information on the operation of this equipment is given in a bulletin of the Colorado Highway Department by James E. Maloney, chief engineer of the department, in the maintaining of county roads near Denver. 600 words. Engineering and Contracting, January 1. 15 cts.

American Methods and Machinery Applicable to Construction and Maintenance of French Highways. An article the object of which is to assist engineers in France in restoring the roads that have been worn out by war traffic or destroyed by the enemy. 16 ills., 6,000 words. By Arthur H. Blanchard, M. Am. Soc. C. E. M Societe des Ingenieurs Civils de France. Consulting Highway Engineer, N. Y. C. Municipal Journal, January 11. 10 cts.

Streets:

Street Paving in San Francisco. Basalt blocks for heavy traffic, brick for steep grades and asphalt and bituminous concrete for easy grades; methods of constructing base and wearing surface; grading streets; cost. 3 ills., 2,000 words. Municipal Journal, January 4. 10 cts.

Street Paving in San Francisco. Where brick pavements are used and how laid; use of asphalt pavements; asphalt repairs; rock asphalt. 5 ills., 1,600 words. Municipal Journal, January 18. 10 cts.

Paving in Winnetka. Method of improving macadam streets of the village of Winnetka, Ill., described by H. L. Woolhiser, business manager of village. 300 words. Municipal Journal, January 25. 10 cts.

What Is a Street? Editorial discussion on the correct use of the word; term should include all parts of the way—roadway, gutters and sidewalks, and not alone that part of a highway intended for vehicles. 500 words. Municipal Journal, January 18. 10 cts.

Grade Crossings:

Grade Crossing Elimination Procedure. Summary of laws, methods of carrying on work and distribution of the cost in several states. From a paper presented at the meeting of the American Association of State Highway Officials, Chicago. By M. W. Watson, acting state highway engineer, Kansas Highway Commission. 3,000 words. Good Roads, January 18. 10 cts.

Summary of State Laws for Elimination of Railroad Grade Crossings. Collected by the Kansas Highway Commission and summarized by M. W. Watson, acting state highway engineer of Kansas. From a paper presented at the meeting of the American Association of State Highway Officials. 2,300 words. Engineering and Contracting, January 1. 15 cts.

Maintenance:

English Experience with Road Corrugation. Indicating probable causes of the trouble, with some suggestions for preventing or alleviating it. Abstract of paper presented before the Institution of Civil Engineers by Ernest L. Leming. 1,000 words. Engineering and Contracting, January 1. 15 cts.

Patrol Method of Road Maintenance as Employed in Maine. In charge of State Highway Commission; selection and wages of patrolmen; cost of maintenance by patrol system. 1,200 words. Engineering and Contracting, January 1. 15 cts.

Performance of New Jersey Highways Under Heavy Motor Truck Traffic. Light pavement base broken down; failure to remove snow costly; maintenance difficulties. By W. G. Thompson, state highway engineer, Trenton, N. J. 1,700 words. Municipal and County Engineering, January. 25 cts.

French Roads and the War. Transportation by truck for the American army has made necessary resurfacing hundreds of miles of road; equipment and men needed. By E. A. Kingsley, major of engineers, A. E. F. 1,300 words. Municipal Journal, January 25. 10 cts.

Pavements:

Latest Seattle Specifications for Brick Paving are for the Monolithic Type. Why sand filled pavements fail; author prefers cement grout filler. By W. H. Tiedeman, assistant city engineer, Seattle. 1,800 words. Municipal and Country Engineering, January. 25 cts.

Bituminous Surfaces in York County, Ont. Ideas developed in connection with the building and maintaining of water-bound and bituminous-bound macadam roads. Paper read at the meeting of the Ontario Good Roads Association. By E. A. James, engineer, Toronto and York Highway Commission. 1,800 words. Canadian Engineer, January 16. 15 cts.

Experience with Sand Clay Road Surfacing in Nebraska. Properties of the materials and where they are found; mixture of sand and clay. By Geo. E. Johnson, state engineer of irrigation, highways and drainage, Lincoln, Neb. 3 ills., 1,500 words. Municipal and County Engineering, January. 25 cts.

Miscellaneous:

Marking and Mapping the Wisconsin Trunk Line Highway System. Trunk lines are numbered in order of their length in miles: marking covers 5,300 miles. From a paper by A. R. Hirst, presented at a joint session of the fourth annual meeting of the American Association of State Highway Officials and the annual meeting of the Highway Industries Association. 3 ills., 1,700 words. Good Roads, January 11. 10 cts.

One Course Sidewalks Feature of Donora Concrete Housing Development. Contract was let for approximately 25,000 square feet of 5-foot walk, 4½ inches thick. 2 ills., 600 words. Engineering and Contracting, January 1. 15 cts.

Characteristics of War-time Highway Work in Great Britain and the United States. War conditions have been injurious to roads in both countries and immediate maintenance is necessary; each has recognized the importance of better systems, nationally organized. 4,600 words. Engineering News-Record. January 9. 20 cts.

The Federal Aid Road Law; Experience to Date and Suggestions for Better Co-operation. By the late Logan Waller Page, for many years director of the U. S. Bureau of Public Roads. Paper prepared for presentation at the fourth annual meeting of the American Association of State Highway Officials at Chicago. 10 ills., 3,700 words. Municipal and County Engineering, January. 25 cts.

Boulevards of San Francisco, California. Notes on the history and construction of the scenic drives in and near the Golden Gate city. By Charles W. Geiger. 5 ills., 2,200 words. Good roads, January 4. 10 cts.

Proposed Route for a New York-Chicago Trunk Line Highway. Suggestion that it follow the New York Central Railroad through New York State. By J. Y. McClintock, county superintendent of highways, Monroe county, N. Y. 400 words. Good Roads, January 18. 10 cts.

How the Successful Campaign for the $60,000,000 Good Roads Bond Issue Was Conducted in Illinois. Wide indorsement by state and local organizations; forming of county and precinct organizations; publicity through newspapers, literature and motion picture film; financing the campaign. By S. E. Bradt, state superintendent of highways, Springfield, Ill. 1 chart, 2,800 words. Municipal and County Engineering, January. 25 cts.

Carrying Good Roads to Japan. Dinner given in Tokyo by Samuel Hill, former president of the American Road Builders' Association, inaugurates movement for highway improvement. By Lawrence William Pedrose. 1 ill., 700 words. Good Roads, January 18. 10 cts.

Proposed Federal Aid Measures. Various bills for government participation in highway improvement introduced in the Senate and House of Representatives. 900 words. Good Roads, January 4. 10 cts.

State Highway Work in 1919. Reports on plans for the work of the coming road building season from leading commonwealths indicate year of renewed activity. 3,200 words. Good Roads, January 4. 10 cts.

Engineers for Highway Work. Inadequate pay of highway engineers; placing entire responsibility for county road management on highway engineer; cooperation of highway departments and colleges. 600 words. Engineering and Contracting, January 1. 15 cts.

Eastern Ontario Good Roads Association. Loses its president, who has moved to Toronto; resume of the good work accomplished since last July by this energetic organization. 1 ill., 600 words. Canadian Engineer, January 16. 15 cts.

SEWERAGE AND SANITATION.

Sewer Construction:

Rosedale Creek Sewer Extension, Toronto. Circular brick sewer 2,598 feet 6 inches diameter, one per cent. grade; constructed partly in tunnel, using compressed air. 4 ills., 1,300 words. Canadian Engineer, January 23. 15 cts.

Rideau River Intercepting Sewer, Ottawa. Most interesting part of the work was the tunneling under railway tracks. 6 ills., 1,500 words. Canadian Engineer, January 2. 15 cts.

Light and Heavy Equipment Compared on Identical Sewer Construction. Field costs per unit of sewer are substantially the same for both plants; greater speed possible with heavier plant, according to results obtained. By Ralph H. Burke, division engineer in charge of sewer work, Sanitary District of Chicago. 3 ills., 3 tables, 1,500 words. Engineering News-Record, January 23. 20 cts.

Stream Pollution:

Dissolved Oxygen as Index of Pollution. A distinct difference between summer and winter saturations; less danger from pollution in cold weather; worst conditions are found near sewer outlets. By Kenneth Allen, engineer of sewage disposal, Board of Estimate and Apportionment, New York. 1,200 words. Fire and Water Engineering, January 22. 15 cts.

Dissolved Oxygen as Index of Pollution. Tests begun by the Metropolitan Sewerage Commission in 1909 in New York City have been continued by the Board of Estimate and Apportionment to the present time, and show a surprising and persistent decline in the degrees of saturation in all parts of the harbor. 900 words. Engineering and Contracting, January 8. 15 cts.

Sewage Treatment:

Fine Screens and Chlorine Meet Daytona Condition. Ample dilution; chlorine removes 80% of bacteria; Imhoff tanks elsewhere more efficient than screens at Daytona. By George W. Simons, Jr., sanitary engineer, State Board of Health, Jacksonville, Fla. 2 tables, 1,600 words. Engineering News-Record, January 9. 20 cts.

Performance of the Ransome Drifting Sand Filters at Toronto, Ont. Plant fulfills requirements; chloramine treatment at Ottawa. 1 ill., 800 words. Municipal and County Engineering, January. 25 cts.

Design and Operation of Fort Meyer Sewage-Treatment Plant. Pioneer among standard camp sewage works consists of one-story tank, dosing chamber and sprinkling filters; low first costs; produces good effluent. By Leonard S. Doten, Major, Quartermaster Corps., Sanitation Section, War Dept., Washington. 3 ills., 1,800 words. Engineering News-Record, January 30. 20 cts.

Treatment and Disposal of Creamery Wastes. Settling tank and sandbed designed and tested by United States Public Health Service gives satisfactory results. By Earle B. Phelps, professor of chemistry, Hygienic Laboratory, U. S. Public Health Service. 1 ill., 2 tables, 1,800 words. Municipal Journal, January 25. 10 cts.

Sanitation:

Sanitary Engineers Get Direct Results in East Indian Mining Camp. Experience at Namtu is typical of tropical sanitation in rural India; jungle cleaning and drainage are successful measures in mosquito suppression; local conditions and habits. By Harry N. Jenks, sanitary engineer, Burma Mines, Limited, Namtu, Burma. 4 illus., 3,000 words. Engineering News-Record, January 23. 20 cts.

Medical Inspection at Miami Camps checks Influenza. First aid hospitals, local doctors and chief district physician held back epidemic at five conservancy dams. 2 ills., 700 words. Engineering News-Record, January 23. 20 cts.

Xenia's Typhoid Epidemic. After investigation the State Department of Health attributed the epidemic to defective hypochlorite used as a disinfectant. 500 words. Municipal Journal, January 11. 10 cts.

Our Duty to the Returning Soldiers—and Ourselves. United States Public Health Service is pointing out the duty of clearing the nation from vice diseases, which war demonstrated were the prime causes of inefficiency within the nation. 600 words. Municipal Journal, January 4. 10 cts.

WATER SUPPLY.

Construction:

The Water Supply of Montevideo, Uruguary. Cement used in construction of the concrete reservoir was of the slow-setting quality. Concluded from Jan. 1 issue. 10 ills., 1,800 words. Engineering World, January 15. 15 cts.

Chicago Water Works Intake Crib Tilted Level with Screw Jacks. Lopsided appearance of new superstructure corrected by unique engineering operation; instrument man on center tower controlled moves by means of twenty-four level targets. 4 ills., 1,300 words. Engineering News-Record, January 30. 20 cts.

Raising Two Lines of 24-inch Water Main Seven Feet. Screw rods operating through timber cross-blocks supported on piles were recently used for this purpose at Boston, by the Boston & Lockport Block Co., in connection with the extension of its plant. By Fred J. Sauer, Jr. 2 ills., 1,300 words. Engineering News-Record, January 30. 20 cts.

Methods Employed in Lowering a 12-Inch Water Main Under Full Pressure. From the report of the water commissioners of Middletown, Conn. 600 words. Municipal and County Engineering, January. 25 cts.

War Wage Increase Met by Revising Construction Plan. Concrete output multiplied sixfold on new St. Paul reservoir by changing method of operating traveling mixing plant. 5 illus., 2,000 words. Engineering News-Record, January 9. 20 cts.

Materials:

Lead Pipe Couplings. Discussing the joints commonly used in service pipe connections and the development that has taken place, for the purpose of improvement and prolonging the life of the service and its various appurtenances. By John A. Jensen, supervisor, Minneapolis Water Works. 2,000 words. Canadian Engineer, January 2. 15 cts.

Reinforced Concrete Pressure Pipe. Experience gained lately shows that concrete properly made and sufficiently reinforced will resist safely internal and external stresses up to 100 pounds per square inch. Paper read before the Illinois Section of the American Water Works Association. By Coleman Meriwether. 2 ills., 2,000 words. Canadian Engineer, January 16. 15 cts.

Growing Demand in Foreign Countries for American Made Pipe and Fittings. Remarkable increases in the export to Mexico, Japan and Canada. 600 words. Fire and Water Engineering, January 8. 15 cts.

Frozen Pipes:

Protection Against Freezing. How Winnipeg's water mains, fire hydrants and valves are taken care of during the winter. By T. H. Hooper, operating supt., Winnipeg Water Works. 700 words. Canadian Engineer, January 23. 15 cts.

Cold Weather and Mains in Duluth. Experiences with freezing and thawing of water and gas mains; services thawed by electricity; ground froze 8 feet deep. 2,000 words. Municipal Journal. January 4. 10 cts.

Thawing Frozen Water Mains. Excerpts of a report by a committee appointed by the New England Water Works Association to investigate conditions caused by the severe winter of last year as regards frozen water mains and services. 1,300 words. Fire and Water Engineering, January 8. 15 cts.

Maintenance:

Results of Cleaning Water Mains at St. Louis. Carrying capacity in certain sections of the distribution system nearly doubled. 4 ills., 300 words. Engineering and Contracting, January 8. 15 cts.

The Cleaning of Water Mains. Service of water pipes lengthened by cleaning the pipes by mechanical means; several methods now in use. 2 ills., 400 words. Fire and Water Engineering, January 1. 15 cts.

Water Main Cleaning in St. Louis. Methods and results in cleaning 50 miles of mains; from 85 to 93 per cent increase in capacity. 4 ills., 700 words. Municipal Journal, January 4. 10 cts.

Water Waste Checked in Buffalo. Condition greatly improved by water department; house-to-house inspection, repairs of leaks and other methods effect the desired result. 1,300 words. Fire and Water Engineering, January 1. 15 cts.

Water Works Conservancy. Combating water waste and leakage; 20 per cent of water lost; education to prevent waste. By Arthur A. Reimer, consulting engineer, East Orange, N. J. 4,500 words. Municipal and County Engineering, January. 25 cts.

Effect of War Conditions on the Operation and Maintenance of Waterworks. Cost of principal materials and supplies, 1914-1918; inadequacy of many waterworks, due to lack of construction work during the war, a menace to public health. From the report of the committee on water supplies, American Public Health Ass'n. 1,500 words. Municipal and County Engineering, January. 25 cts.

Waterworks Operation; Reservoir Maintenance. Investigating leakage from reservoirs: causes of leakage; locating leaks; stopping leaks by use of cement, asphalt, clay, etc. 3,800 words. Municipal Journal. January 4. 10 cts.

Waterworks Operation: Reservoir Maintenance. Preventing pollution of the reservoir from the catchment area; preventing erosion; objectionable features of swamps. 2,000 words. Municipal Journal, January 18. 10 cts.

Waterworks Operation — Reservoir Maintenance. Forestry on catchment areas; the advantages, methods and costs; some figures and results from practice. 2,800 words. Municipal Journal, January 25. 10 cts.

Meters:

Selection of Service Meters. Economy and efficiency should be determining principles; practices and experiences of Passaic water company in use of meters; a period of twenty years covered and 22,000 meters handled. By W. R. Edwards, ass't supt., Passaic (N. J.) Water Co, 1,300 words. Fire and Water Engineering, January 29. 15 cts.

Sizes of Service Meters. Practices and experience of the Passaic Water Company in the use of meters, especially as to the sizes most desirable. By W. R. Edwards, assistant superintendent Passaic Water Company. 1,500 words. Municipal Journal, January 4. 10 cts.

Rates and Duration of Flow in Service Pipes. Investigation of apparatus for recording flow in service pipes, made by Mr. J. E. Garratt at the suggestion of the writer. By Caleb Mills Saville, manager and chief engineer, water department, Hartford, Conn. 2 ills., 2 tables, 1,500 words. Engineering and Contracting, January 8. 15 cts.

Rates:

Division of Water Revenues. Important correspondence on this subject; inquiry as to increasing a city's general revenue by raising water rates and Superintendent O'Schaughnessy's reply. 1 ill., 700 words. Fire & Water Engineering, January 15. 15 cts.

Maintenance of Public Utilities Plants. Old rates now insufficient; effect of war conditions; waterworks rehabilitation. By Robt. J. Thomas, supt. of waterworks, Lowell, Mass. 700 words. Municipal and County Engineering. 25 cts.

Purification:

Operating Features of the Chain of Rocks Filter Plant. During 1917-1918 38,612 million gallons of water were filtered at a cost of $2.74 per million gallons, including the cost of operation, maintenance, repair, light and power, coal and the chemicals used in the applied and filtered water. 1,500 words. Engineering and Contracting, January 8. 15 cts.

Notes on Chlorine Treatment of London, England, Water Supply. Superchlorination and de-chlorination. From the report of Dr. A. C. Houston, director of water examination, Metropolitan Water Board, London. 1,000 words. Municipal and County Engineering, January. 25 cts.

Taking a Chance with an Unsafe Water Supply Proves Costly. Imperfect disinfection of part of the water supply at Xenia, O., was responsible for the outbreak of 44 cases of typhoid fever in the fall of 1918. 700 words. Municipal and County Engineering, January. 25 cts.

Find Cause of Obnoxious Tastes in Milwaukee Water. Coal tar derivatives from coke and phenol plants produce taste when diluted one part in 500 mil-

lion. By H. P. Bohmann, supt., Milwaukee waterworks. 2,300 words. Engineering News-Record, January 23. 20 cts.

Chlorination of Chicago's Water Supply. Installation of apparatus; description of the aerisostat. By John Ericson, C. E., city engineer of Chicago. 1 ill., 2,100 words. Municipal and County Engineering, January. 25 cts.

Need of Certain Investigations for Increasing the Efficiency of Water Filter Plant Design and Operation. Most efficient mix with least loss of head; time and intensity of agitating water; mechanical agitation; securing ideal coagulation. By James W. Armstrong, filtration engineer, water department, Baltimore, Md. 1,400 words. Municipal and County Engineering, January. 25 cts.

Billings Waterworks Notes. Superintendent Willett recommends using existing earth settling basins when the river is most turbid, to secure sedimentation of the suspended matter before coagulants are applied. 300 words. Municipal Journal, January 11. 10 cts.

Wash Troughs for Rapid Sand Filters. Results of investigation to determine surface curves for flow of water in wash water troughs; development of formula of assistance to designers. By Frank V. Fields, Cornell University. 2 ills., 2 tables, 1,600 words. Fire and Water Engineering, January 8. 15 cts.

Irrigation:

Some Financial, Agricultural and Engineering Aspects of Irrigation. Growth of irrigation in the United States; choice of land; financing; water supply, the greatest single factor. By Chas. Kriby Fox, consulting and contracting engineer, Pomona, Cal. 2,400 words. Municipal and County Engineering, January. 25 cts.

Rural Water Supplies. Primitive systems in use in Northwestern Canada; community reservoirs and springs; the coulee utilized to form water supply; Saskatchewan dry in southwest, wet in northeast. By E. L. Miles, inspecting engineer, department of irrigation, province of Saskatchewan. 3 ills., 2,300 words. Fire and Water Engineering, January 22. 15 cts.

Actual Quantities of Water Used on Irrigation Projects of U. S. Reclamation Service. General data on the experience of the Service in the use of water on its several irrigation projects, given by E. A. Moritz, engineer of the Service, in the Reclamation Record. 1 table, 1,500 words. Engineering and Contracting, January 8. 15 cts.

Miscellaneous:

Philippine Water Supplies Get Strict Sanitary Supervision. Good water reduces death rate 50 per cent; government encourages wells by paying two-thirds cost; amoeba normally in water not removed by filtration but not disease producers. By Geo. W. Heise, Saltville, Va., former chief of the section of water analysis, Bureau of Science, Philippine Islands. 3,600 words. Engineering News-Record, January 30. 20 cts.

Portsmouth Waterworks. Reported upon last month by the National Board of Fire Underwriters; $1,000,000 expenditure authorized by the Federal government for improvements. 300 words. Municipal Journal, January 18. 10 cts.

The New England Waterworks Association. Annual meeting at Boston; new officers elected for the ensuing year and an ambitious program outlined for the Association's activities. 2,600 words. Fire and Water Engineering, January 15. 15 cts.

LIGHTING AND POWER.

Water Power Resources:

Investigation of Maine Water Powers. Public utilities commission sends to governor and council the result of an exhaustive study of water-power resources; hydroelectric systems, power sites, plant locations and storage conditions dwelt on. 1 map, 1,300 words. Electrical World, January 18. 15 cts.

Recent Hydroelectric Development in Tasmania. 70,000 hp. now made available and other more promising development to be started; electrical construction peculiar to that system; a new field for electric apparatus opened in the Antipodes. By L. W. Alwyn-Schmidt, N. Y. Economic Service Bureau. 4 ills., 1,600 words. Electrical World, January 11. 15 cts.

Factors Retarding Water-Power Development. And the advantages gained by utilizing available water resources; efficiency of the steam turbine a big consideration. By D. H. Colcord, Westinghouse Electric & Mfg. Co., Pittsburgh. 1,100 words. Canadian Engineer, January 23. 15 cts.

Water Power Resources Conference at Ottawa. Dominion and provincial officials in charge of water power administration meet with members of Dominion Power Board and discuss coordination of investigations and administration; water resources index-inventory scheme adopted. 1,700 words. Canadian Engineer, January 23. 15 cts.

Steam Plants:

Selecting Coal for Power Plant Use. Article pointing out characteristics of various coals; influence of coal upon furnace-chamber proportions; purchase of coal. By Robert June, mechanical engineer. 4 ills., 3 tables, 3,000 words. Electrical Review, January 18. 30 cts.

Conservation of Heat Losses from Pipes and Boilers. Complete detailed method of calculating and solving heat losses; economic solution to practical applications; abstract A. S. M. E. paper. By Glen D. Bagley, engineer, Mellon Institute of Industrial Research. 9 ills., 4 tables, 3,000 words. Electrical Review, January 18. 30 cts.

New Plant of the Appalachian Power Company. Steam station rated at 20,000 kw. just completed to supplement hydroelectric plants in meeting heavy industrial requirements; development of rich mining district due largely to central-station power supply. By H. S. Slocum, engineer with Vielé, Blackwell & Buck. 9 ills., 2,600 words. Electrical World, January 18. 15 cts.

Electric Plants:

Features of Three-Phase-Two-Phase Generating Station. Addition to Eastern Wisconsin Electric Company's Sheboygan plant comprises interesting installation and operating features. 9 ills., 1 table, 1,600 words. Electrical Review, January 18. 30 cts.

Economical Operation of Hydraulic Turbines. Cleanliness, care and upkeep are the important factors in obtaining maximum efficiencyq. By Eugene U. Gibbs. 1,500 words. Canadian Engineer, January 9. 15 cts.

An Operating View of High-Tension Insulators. Severe operating conditions that have caused failure of line insulators; later design of pin and suspension types promise to solve insulator problem for some years to come. By P. Ackerman, electrical engineer, Toronto Power Co. 4 ills., 4,400 words. Electrical World, January 18. 15 cts.

Extension to the Ontario Power Co.'s Plant. Construction of 1.3 miles of 13.5 ft. miameter wood staves pipe for 50,000 H.P. capacity, an[illegible] of one of the largest differential surge tanks ever built; power house designed to withstand water pressure to crane rail. By Thos. H. Hogg, ass't hydraulic engineer, Hydro-Electric Power Commission of Ontario. 23 ills., 6,000 words. Canadian Engineer, January 16. 15 cts.

Lighting:

Use of Electric Instruments to Measure Gas. Description of gas-making process and application of Thomas meter, as recently installed by Laclede Gas Light Co. 2 ills., 1,300 words. Electrical Review, January 11. 30 cts.

Electric Lighting Plant Among the Essentials on the Modern Farm. How living conditions have improved on the farm; farmer wants electrical conveniences and will pay freely for them. By George W. Hill. 3,000 words. Electrical Review, January 25. 30 cts.

FIRE DEPARTMENT.

Fire Departments:

The Boston Fire Department. Report of the committee on fire prevention of the National Board of Fire Underwriters on conditions in the department; conclusions and recommendations. 1,000 words. Fire and Water Engineering, January 8. 15 cts.

Problems of the Small Town Fire Department. Acetylene gas fire fought with chemicals; local firemen have fought fires in Emmet, Kan., with an equipment consisting of ten 3-gallon chemical fire extinguishers. 1,000 words. Fire and Water Engineering, January 8. 15 cts.

Annual Reports. Majority of chiefs show smaller fire losses in 1918 than in previous year. 1,500 words. Fireman's Herald, January 18. 10 cts.

Fire Departments in American Cities. Giving statistics of the 219 American cities estimated to have more than 30,000 inhabitants. 1,500 words. Pacific Municipalities, January. 25 cts.

Chief Kenlon on Bravery. The head of the New York Fire Department tells of difference between the old and present department; men are more scientific, but as brave as ever; some heroic instances cited. 1 ill., 1,600 words. Fire and Water Engineering, January 29. 15 cts.

Fire Prevention:

Press Cooperation in Fire Prevention. The assistance of the daily and weekly press of the utmost importance; the best medium to reach the masses; class journals also should be called upon to help in spreading the doctrine of fire prevention. By Alfred Fleming, president of the Fire Marshals' Ass'n of North America. 1 ill., 1,600 words. Fire and Water Engineering, January 22. 15 cts.

Individual Liability for Fires Due to Carelessness or Neglect. Object sought in securing for a municipality penal responsibility for fires due to carelessness, is the prevention of fires; city ordinance suggested. By Chief Frank L. Hilton, Alhambra, Cal. 900 words. Fire and Water Engineering, January 1. 15 cts.

Fire Walls and Horizontal Fire Escapes. Views of two chiefs of Canadian departments on these important matters; confining the fire area of immense importance; the tower stairway. By Chief Wm. J. Early, St. Catherines, Ont., and Chief Jas. Corbett, Toronto, Ont. 2,000 words. Fire and Water Engineering, January 8. 15 cts.

Fire Fighting:

Boston High Pressure System. Completion being considered; first advocated ten years earlier and partly installed but never put into operation; additional motor apparatus and rearrangement of districts part of plans for coming year; rescue company a feature. 2 ills., 2,000 words. Fire and Water Engineering, January 15. 15 cts.

Emergency Wrecker of the Boston Fire Department. Apparatus has rendered wonderfully efficient service since it was installed about two years ago. By H. Belknap. 1 ill., 800 words. Fire and Water Engineering, January 15. 15 cts.

Forest Fires in Montana. The state fire marshal describes the work of his department in handling and preventing conflagration in the immense forest preserves. By E. A. Eklund. 1 ill., 2,500 words. Fire and Water Engineering, January 1. 15 cts.

The Fire Alarm Telegraph. Influence of modern discoveries on the system; history of transmission of alarms by wire; discoveries not always accidental. By James B. Yeakle, supt. of fire alarm telegraph, Baltimore. 2,000 words. Fire and Water Engineering, January 22. 15 cts.

TRAFFIC AND TRANSPORTATION.

Highway Traffic:

Regulation of the Speed, Weight, Width and Height of Motor Trucks and Trailers. Abstract of paper presented at the joint session of the American Ass'n of State Highway Officials and the Highway Industries Ass'n at Chicago. By George M. Graham, chairman, motor truck committee, National Automobile Chamber of Commerce. 2,300 words. Good Roads, January 25. 10 cts.

Segregating Traffic. Comments on regulations adopted for New York City and modifications recommended. 700 words. Municipal Journal, January 25. 10 cts.

Proposed Uniform Law for Regulation of Speed and Dimensions of Motor Trucks. Manufacturers agree on uniform truck law; responsibility of trucks for damaged condition of roads. By George M. Graham, chairman National Motor Truck Committee of National Automobile Chamber of Commerce. 1 table, 1,600 words. Engineering and Contracting, January 1. 15 cts.

Proper License Fees for Motor Vehicles and Drivers. Public should pay for the construction of roads, and vehicles be taxed for the maintenance. From a paper presented at the joint session of the American Ass'n of State Highway Officials and the Highway Industries Ass'n., Chicago. By H. E. Breed, first deputy commissioner, N. Y. Commission of Highways. 2,700 words. Good Roads, January 11. 10 cts.

Censuses Show Three Fold Increase in Traffic on Massachusetts Highways in 9 Years. Interesting data given by Col. W. D. Sohier, chairman of the State Highway Commission, at a meeting of the Ass'n of State Highway Officials. 1,400 words. Engineering and Contracting, January 1. 15 cts.

Miscellaneous:

The Fuel Administration and the Skip-Stop. How the Federal government and the electric railways cooperated in several ways to save fuel, with special reference to eliminating unnecessary stops. By J. F. Layng, General Electric Co. 5 ills., 5,000 words. Electric Railway Journal, January 4. 15 cts.

Collecting Zone Fares in Boston. Professor Richey shows that two-zone plan for Boston elevated railway is best first step toward the ideal; proposes a concrete plan for getting the fares. 1 ill., 4,800 words. Electrical Railway Journal, January 18. 15 cts.

Committee Analyzes Track-Elevation Costs or Rock Island Work in Chicago. Book figures are redistributed, freight charges and other elements of expense estimated and added in, to obtain complete unit costs for fifty items on $2,700,000 improvement. 2,400 words. Engineering News, January 9. 20 cts.

Transportation and Power. Energy must be shipped in bulk unless special transportation facilities are provided for the concentrated product; common carriers needed for power. By C. G. Gilbert and J. E. Pogue, Division of Mineral Technology, U. S. National Museum. 3,000 words. Canadian Engineer, January 9. 15 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Street Cleaning:

Street Cleaning Report for Rochester. Recommendations for organization of force, municipalization of collection service and purchase and use of equipment; data concerning work done by street cleaning force; stables and shops. 2 ills., 1 table, 3,000 words. Municipal Journal, January 18. 10 cts.

The Streets of Washington, D. C. Editorial expressing the hope that the capital will pay more attention in the future to civic cleanliness, neatness and orderliness. 600 words. Municipal Journal, January 11. 10 cts.

Consideration of Health Important factor in Determining Extent of Street Cleaning. From the report of G. H. Norton, Rudolph Herring and R. C. Harris, submitted to the last annual convention of the American Society of Municipal Improvements. 400 words. Engineering and Contracting, January 1. 15 cts.

Snow Removal:

Snow Sweepers Made from Open Cars. Emergency conditions made unusual procedure necessary; cost was less than $900 per sweeper. By J. W. Hume, supt. of equipment, International Railway Co., Buffalo, N. Y. 2 ills., 700 words. Electric Railway Journal, January 18. 15 cts.

Electric Railway Snow Fighting Equipment and Its Applications. Use of brushes, snow scrapers, sweepers, plows, flangers, etc. 1,300 words. Engineering and Contracting, January 15. 15 cts.

Snow Removal from New York State Highways. Save the sleighing; snow removal equipment; local choice of routes. By Enwin Duffey, state commissioner of highways, Albany. 1,400 words. Municipal and County Engineering, January. 25 cts.

Refuse Disposal:

Garbage Disposal in New York. Statement made by Louis L. Tribus of New York City, commenting on that portion of the report of the Pittsburgh committee referring to New York City. 250 words. Municipal Journal, January 4. 10 cts.

Street Cleaning and Refuse Disposal in Savannah. Itemized and unit costs of cleaning different kinds of pavements; destructor expenditures and credits; oiling catch basins. 1 table, 1,000 words. Municipal Journal, January 18. 10 cts.

National Waste Reclamation. Promotion work to be taken over by Department of Commerce as a permanent waste reclamation service; value of materials reclaimable. 1,000 words. Municipal Journal, January 18. 10 cts.

MATERIALS AND STRUCTURES.

Use of Crushed Stone. Figures given out by the U. S. Geological Survey showing the sales of this material in 1917; more than 40 million tons valued at more than $29,000,000. 400 words. Municipal Journal, January 18. 10 cts.

Concreting in Cold Weather. Suggestions for carrying on concrete construction in cold weather, abstracted from a pamphlet issued by the Portland Cement Association. 1,500 words. Municipal Journal, January 4. 10 cts.

Temperature Record of Cold Weather Concrete. Simple and inexpensive method of securing temperature records described by L. J. Towne in the December Stone and Webster Journal. 2 ills., 1,000 words. Engineering and Contracting, January 12. 15 cts.

Experimental Data on Wood-Blocks; Use of Zinc-Treated Ties. Progress reported on wood-block experiments in Minneapolis. Extracts from two papers presented at the meeting of the American Wood Preservers' Ass'n at St. Louis. By C. H. Teesdale, J. D. MacLean and S. W. Allen. 1 ill., 2,100 words. Engineering News-Record, January 30. 20 cts.

The Franklin-Orleans Bridge. This bridge is an unusually long one for a double-leaf trunnion bascule structure; in progress of construction over the Chicago River. 7 ills., 1,000 words. Engineering World, January 15. 15 cts.

Holding a Bulging Retaining Wall with Buttresses. High fill of slippery material forces out dry wall; grouting and buttresses solve difficulty satisfactorily. 4 ills., 1,000 words. Engineering News-Record, January 23. 20 cts.

Big Eddy Conservation Dam. Being erected near High Falls, on the Spanish River, by the International Nickel Co., at an estimated cost of $1,750,000; general dimensions. 2 ills., 700 words. Canadian Engineer, January 9. 15 cts.

GOVERNMENT AND FINANCE.

Public Ownership, Public Control, or What? Editorial comment on the changes that seem impending in the relations between public service corporations and the public as represented by city, state and federal governments. 700 words. Municipal Journal, January 4. 10 cts.

Why Municipal Ownership Sometimes Fails. Editorial comment on the discharging of 350 engineers employed on the subways of New York City, on December 31. 700 words. Municipal Journal, January 25. 10 cts.

Promote the Welfare of the Community. All forms of autocracy should be deposed in our own country also; rule of reason necessary in reconstruction, and capital and labor alike will have to abandon all autocratic methods; reforms that are essential. By Carl Hering. 2,400 words. Electrical World, January 11. 15 cts.

Recent Developments in Service-at-Cost Franchises for Utilities. The principal provisions of the various service-at-cost franchises of electric railway companies are described with great care and compared as to results; conclusions drawn as to the most desirable forms of such a franchise. By L. R. Nash, Stone & Webster, Boston, Mass. 2 ills., 23,000 words. Electric Railway Journal, January 4. 15 cts.

Boulder's Budget. The first comparative budget of the city prepared by City Manager E. O. Heinrich, shows completeness combined with conciseness and simplicity. 250 words. Municipal Journal, January 11. 10 cts.

Special Assessments for Local Improvements. Information collected by the secretary of the N. Y. State Ass'n of Mayors and other city officials on the practice of cities in levying and collecting assessments. 800 words. Engineering and Contracting, January 1. 15 cts.

Recent Events and Utility Valuation. The great war has changed the practice of considering past cost proper measure of value; value not constant, but subject to fluctuation. By J. W. Alvord, consulting engineer, Chicago, 1 ill., 3,000 words. Fire and Water Engineering, January. 15 cts.

Finances of Cities: 1917. Figures given of the revenues, expenditures and indebtedness of the larger cities of the country; in 129 of the 219 cities of more than 30,000 population, the excess of expenditures for governmental costs over revenues amounted to $69,461,352, or $3.90 per capita. 1,300 words. Pacific Municipalities, January. 25 cts.

Combined Purchasing of Machinery and Supplies for Municipalities. Cities and towns could save many thousands of dollars annually through the medium of central purchasing plan. By W. G. McMillan, state purchasing agent, California. 2,300 words. Pacific Municipalities, January. 25 cts.

Inadequate Salaries. Being paid to municipal engineers: Chicago chapter of the American Association of Engineers makes strong protest to mayor and city council. 800 words. Canadian Engineer, January 2. 15 cts.

MISCELLANEOUS.

Chicago Plan Commission Proposes Great Improvement Scheme. Widening and extending Michigan and a number of other avenues and removal and revision of terminals, included in the program for the development of the city. 1 ill., 700 words. Engineering News-Record, January 23. 20 cts.

Housing Construction at Craddock. Building a project near the Portsmouth Navy Yard to provide homes for five thousand workers; distributing railroad; central concrete plant; concrete delivered by tractors; progress clock. 4 ills., 1,300 words. Municipal Journal, January 25. 10 cts.

Construction Features of Government Housing Development at Craddock, Va. Building a complete city capable of housing more than 5,000 people; parks, playgrounds, town squares and boulevard system, encircling the city, provided; distributing railroad. 4 ills., 1,000 words. Engineering and Contracting, January 15. 15 cts.

Survey of Baltimore's Boundary. Legislature of Maryland passes an act in March, 1915, providing for annexing additional areas to the city. 500 words. Municipal Journal, January 11. 10 cts.

Relation of the Curve to Town-Planning. Not a single straight street line in some plans; some others show curved lot boundaries; discussion of methods employed in laying out curves for street or lot lines; new handbook of curve tables required. By H. L. Seymour, town planning assistant, Commission of Conservation. 4 ills., 2,300 words. Canadian Engineer, January 9. 15 cts.

Topographical Surveys in Connection with Rural Planning. Soil and land surveys for assessment purposes; what a topographical sheet should show. By W. H. Norrish, from paper at the meeting of the Ass'n of Dominion Land Surveyors. 1,000 words. Engineering and Contracting, January 1. 15 cts.

Municipal Peace Readjustment. How American cities are planning to solve this problem; public works which will be constructed; opinion of municipal officials. Report at meeting of Mayors and Other City Officials of State of New York, by Mark I. Koon, Mayor of Auburn. 3,000 words. Municipal Jaurnal, January 25. 10 cts.

The Rebuilding of Devastated France. Definite plan for the physical reconstruction of France and possibly all Europe. By John V. Schaeffer, M. E. 2,300 words. Enginering World, January 15. 15 cts.

The Facts on the Devastation and the Present Reconstruction Efforts in France. Detailed summary of the extent and character of the destruction, with a complete account to date of the measures, official and otherwise to re-establish the invaded regions. By Geo. B. Ford, deputy commissioner of the American Red Cross, Paris. 8 ills., 9,000 words. Engineering News-Record, January 30. 20 cts.

Plan Introduced for Reconstrucing War Devastated Countries. Disposal of immense government stores embodied in new idea of restoration. 1,000 words. Electrical Review, January 11. 30 cts.

Provide Work for Returned Soldiers. Editorial discussion on the necessity of providing immediate oportunity for soldiers to earn a living; each city or town should provide for its own citizens; when positions with private firms are not sufficient public work should be provided. 500 words. Municipal Journal, January 25. 10 cts.

Soldiers' Memorials. Editorial discussion as to what form of memorial is most desirable for the commemoration of our soldiers in the World War. 500 words. Municipal Journal, January 18. 10 cts.

Experiences at Worcester, Mass., in Public Work Construction by City Forces. Albert T. Rhodes, former street commissioner of Worcester, is of the opinion that the municipalties' forces, if properly organized, can bring about better, more durable results than by contract work. 1,300 words. Engineering and Contracting, January 1. 15 cts.

Relation Between Civil and Military Engineers. Fundamental principles remain same, but methods of application change. By Major-General Wm. M. Black, chief of engineers, U. S. A. 2,300 words. Engineering and Contracting, January. 15 cts.

Efforts to Consolidate the Engineering Profession. More federation and simplification which means elimination are advocated; problems which demand solution are outlined. By A. D. Flinn, secretary, Engineering Council, New York. 2,500 words. Engineering News-Record, January 9, 1919. 20 cts.

Political Piracy with the Engineer as Victim. Editorial comment on the action of New York City's governing body, the Board of Estimate and Apportionment, in tearing to pieces the Public Service Commission's engineering department; more than 300 engineers thrown out on a few

hours' notice. 800 words. Engineering News-Record, January 9. 20 cts.

Savannah's Department of Stables and Shops. Duties include the care and feeding of all live stock, maintenance and upkeep of all vehicles and rolling stock. 400 words. Municipal Journal, January 4. 10 cts.

Public Works Photography. In his annual report, S. Q. Cannon, city engineer of Salt Lake City, makes references to changes in the engineering department's practice in the taking of photographs and blue printing. 250 words. Municipal Journal, January 11. 10 cts.

Research Council's Work. Review of activities for the year; situation in Canada in regard to the application of science to industry. By Dr. A. B. Macallum, administrative chairman, Honorary Research Council. 1,800 words. Canadian Engineer, January 2. 15 cts.

Comparison of Railroad Terminal Projects at Cleveland. Relative advantages of lake-front project decided upon some years ago and public-square location approved by recent vote, as seen by various engineers. 3 maps, 3,300 words. Engineering News-Record, January 30. 20 cts.

The Port of Seattle. Exists independently of city and county; affairs controlled and administered by a commission of the port of Seattle, which operates terminals, ferries and other facilities. By W. A. Scott. 4 ills., 1,000 words. Engineering World, January 15. 15 cts.

THE MUNICIPAL INDEX

(*Concluded from page 57, January 18, 1919*)

A Study of the Slip in the Calaveras Dam. Based on a survey, borings and pile drivings; consideration of materials used for steam-shovel and sluiced fill; reconstruction plans. By Allen Hazen, consulting engineer, N.Y.C. 3 ills., 6,200 words. Engineering News-Record, December 26. 20 cts.

LIGHT AND POWER.

Power Plants:

Electric Power Generation in Ontario on Systems of Hydro-Electric Power Commission. This commission, now the largest producer and distributor of electric energy in the province, was formed by the Ontario Government in 1906. Paper read before the Toronto section of the American Institute of Electrical Engineers. By Arthur H. Hull. 4,700 words. Canadian Engineer, December 12. 2,700 words, December 19. 15 cts.

Economic Operation of Steam Turbo-electric Stations. Bureau of Mines technical paper discussing fuel economy factors, load distribution between units, boiler-room and auxiliaries operation; second installment. By T. C. Hirshfeld and C. L. Karr. 2 ills., 6,200 words. Electrical Review, December 14. 30 cts.

Powdered Coal Substituted for Fuel Oil at Seattle. Puget Sound Traction, Light & Power Company completes installation in central heating plant; system electrically operated. By W. A. Scott. 4 ills., 1,700 words. Engineering and Cement World, December 1. 15 cts.

Reliability of Large Turbines. Answers to questions frequently raised regarding advisability of using larger units, reliability and problems of design; limits of commercial practicability of large units are not yet reached. By J. F. Johnson, engineer, Westinghouse Electric Manufacturing Co. 5 ills., 2,200 words. Electrical World, December 28. 15 cts.

Economic Operation of Steam Turbo-electric Stations. Bureau of Mines technical paper discussing fuel economy factors, load distribution between units, boiler-room and auxiliaries operation. By T. C. Hirshfeld and C. L. Karr. 3 ills., 5,000 words. Electrical World, December 7.

Operating Methods That Increase Economy. The methods of operation here outlined apply to plants having turbo-generators; distribution of loads on boilers and turbines and economical operation of auxiliaries discusse. By Lieut.-Col. C. F. Hirshfeld and C. L. Karr. 3 ills., 5,300 words. Electrical World, December 14. 15 cts.

Removal of Soot from Heating Surfaces and Flues. Use of salt removes heat-insulating and draft-choking soot. By Joseph Harrington, administrative engineer, U. S. Fuel Administration. 1,100 words. Electrical Review, December 7. 30 cts.

Gas:

Influences of B.t.u. on Gas Mantle Efficiency. Extract from technological paper No. 110 of the U. S. Bureau of Standards upon tests made in 1916 and giving valuable data upon the operation of mantle lamps. By R. S. McBridge, W. A. Dunkley, E. C. Crittenden, and A. H. Taylor. 3,500 words. Gas Age, December 2. 25 cts.

Selling Gas on a B.t.u. Basis Is Most Efficient Way. Reconstruction will demand the highest efficiency; commercial advantage of the Doherty rate, how it works and what it means to the gas business explained. By Robert G. Griswold. 3,000 words. Gas Age, December 2. 25 cts.

Inclined Retort Plant at Rome a Success. A recently made installation which has a creditable record for economy and also efficient operation. By S. Bent Russell. 4 ills., 2,400 words. The Gas Age, December 2. 25 cts.

Instruction for Gas Company Fitters, LV. Gas Age handbok series No. 4; a manual of good practice by the general manager of the Niagara Light, Heat and Power Co. of Tonawanda, N. Y. By George Wehrle. 1,000 words, Gas Age, December 2. 25 cts.

Finances:

Grand Jurors Discuss Financial Needs of Gas Co. The Supreme Court of Richmond county, Greater New York, is advised of the lack of co-operation of the Public Service Commission with the needs of company and gas consumers. 2,000 words. Gas Age, December 2. 25 cts.

The Relation of Public Service Commissions to the Gas Consuming Public and to the Gas Companies. Discussion of the ideas that the gas industry holds of the obligations of governmental bureaus to the public and to the gas companies, and the proper methods of procedure in such regulation and development. Paper presented before the Section on Public Utility Law of the American Bar Ass'n, Cleveland, O. By Walton Clark, D.Sc., president of Franklin Institute. 13,000 words. Journal of the Franklin Institute, December. 50 cts.

Attitude of Central Stations on Rates. Questions which are involved in war and peace adjustments of rates to meet changed economic conditions; duration of the period of high costs. 1,400 words. Electrical World. December 7. 15 cts.

Construction:

Excavation Methods and Equipment on Construction of eight and a half mile Niagara Power Canal. General features of canal; earth removal—heavy equipment; rock removal—channeling; rock drilling. 4 ills., 1,300 words. Engineering and Contracting, December 18. 15 cts.

Oxy-Acetylene Pipe Welding and Cutting. A resume of what is considered the best practice in this most useful and very generally employed method of joining metals. 8 ills., 3,500 words. Gas Age, December 2. 25 cts.

Miscellaneous:

Removing Obstacles to Power-Factor Charge. Necessity of standard method of measuring power factor and instrument that would be universally applicable; examination into the methods that are now employed in widely separated plants. By Will Brown, Electric Machinery Co. 1 ill., 2,500 words. Electrical World, December 28. 15 cts.

Conservation of Water Power in New England. Benefits of conserving power through storage developments discussed before special legislative committee on conservation of resources. 1,300 words. Electrical World, December 7. 15 cts.

The Modern Outdoor Substation. Apparatus has been developed until it is as reliable as indoor equipment, but design has not improved so much; notes on transformers, oil circuit breakers, lightning arresters, air-break switches and bus supports. By M. M. Samuels. 10 ills., 4,300 words. Electrical World, December 7. 15 cts.

Growth of Electricity Supply in the United Kingdom. Official war-time figures now available show vast increase in generating capacity and output of British electrical undertakings. 4 tables, 800 words. Electrical Review, December 28. 30 cts.

Producing Electricity at Irrigation Dams for Heating Purposes. Comparison of feasibility of hydro-electric service from Arrow Rock and Minidoka projects. 500 words. Electrical Review, December 28. 30 cts.

Extensive Use of Electricity for San Francisco Harbor. Pier, dock and street lighting; electric clock system; harbor lights and fog signals; fire-alarm and telephone system; electric repair and maintenance service; features of wiring. 4 ills., 5,000 words. Electrical Review, December 28. 30 cts.

FIRE DEPARTMENT.

How to Stop Fires Before They Begin. Such fire prevention exhibits as the one recently held in Newark, N. J., might well be made permanent municipal features. 1 ill., 1,500 words. American City, December. 35 cts.

Universal Platoons. Massachusetts fire chief expects new system to be established in every city. 1,300 words. Fireman's Herald, December 7. 10 cts.

Fire Department Problems. How they are regarded from the standpoint of a city manager. By E. O. Heinrich, city manager, Boulder, Colo. 1,000 words. Fireman's Herald, December 7. 10 cts.

New Britain's Good Idea. Commissioners think crippled soldiers should be employed for fire inspection. 400 words. Fireman's Herald, December 14. 10 cts.

Exposes the Trust. Washington State Commissioner shows enormous profits in fire insurance. 1,000 words. Fireman's Herald, December 14. 10 cts.

Chief Donoghue's Story. Tells how every precaution was taken at the Gillespie plant at Morgan, N. J. 1,200 words. Fireman's Herald. December 14. 10 cts.

Officers Want Platoons. 400 lieutenants of New York fire department join organized labor. 1,500 words. Fireman's Herald, December 14. 10 cts.

New Fire Roads Available. 1,000 miles to be kept clear of snow and enormous government system completed. 2 ills., 1,800 words. Fireman's Herald, December 21. 10 cts.

Ohio Chiefs Meet. Discussion of engineering and fire prevention problems at Columbus. 800 words. Fireman's Herald. December 21. 10 cts.

Returning Firemen. Ex-soldiers again have to pass the civil service examinations. 1,200 words. Fireman's Herald, December 28. 10 cts.

TRAFFIC AND TRANSPORTATION.

Highway Transportation:

Where Lies the Burden of Highway Transportation? Basic elements of highway transportaion are road-bed, vehicles, motive power. By Robert C. Barnett, economic engineer, Missouri Highways Transport Committee. 1 ill., 1,200 words. Good Roads, December 7. 10 cts.

A Suggested National Highway Policy and Plan. Phenomenal growth of interstate motor traffic, favorable attitude of government and people, and magnitude of problem make suggestion timely. By E. J. Mehren, editor. Paper read before Joint Highway Congress at Chicago. 5,800 words. Engineering News-Record, December 19. 20 cts.

The Three Elements of Transportation: Highways, Railways and Waterways. The transportation system of the United States not a unit, but a trinity; highways as feeders for waterways. From an address by Wm. C. Redfield, Secretary of Commerce. 800 words. Engineering and Contracting. December 4. 15 cts.

License Fees for Motor Vehicles and Drivers. Those benefited should pay for highways; theory of marginal utility that public should pay first cost, while user should pay maintenance. By H. Eltinge Breed, first deputy commissioner of highways, N. Y. State. Paper read before the Joint Highway Congress, Chicago. 3,000 words. Engineering News-Record, December 19. 20 cts.

Motor Trucks:

Regulation of Speed, Weight, Width and Height of Motor Trucks Discussed. They are essential transportation agencies, and while regulation is necessary, it should not restrict their expansion; table of proposed dimensions, speeds, weights and fees presented. By Geo. M. Graham, from a paper read before the Joint Highway Congress, Chicago. 1 table, 3,200 words. Engineering News-Record, December 19. 20 cts.

Motor Trucks and Plank Roads Help to Get Out Airplane Spruce. Heavily loaded motor trucks have been operated over unstable soils and through mountainous country, in bringing out airplane spruce from the Northern Pacific coast; this seemingly impossble feat was accomplished by the construction of specially designed plank roads. 5 ills., 3 tables, 1,100 words. Engineering News-Record, December 26. 20 cts.

Street Railways:

Problems of Reconstruction with Respect to Urban Transportation. The present street railway situation and what street railway companies are now seeking to do; wages and conditions of labor to be fixed and strikes to be outlawed. By Delos F. Wilcox, Ph.D. 3,700 words. American City, December. 35 cts.

Storage Yard Rearrangement at Kansas City. Indoor and outdoor car-storage capacity, car-handling facilities and fire protection have all been increased, almost entirely by the use of salvaged material. By A. E. Harvey, supt. of Way and Structure, Kansas City, Mo. 5 ills., 2,400 words. Electric Railway Journal, December 28. 15 cts.

Union Station Loop Operation in Denver. After years of controversy tracks are laid on depot grounds and company now gives quick service. 2 ills., 900 words. Electric Railway Journal, December 28. 15 cts.

The Problem Must Be Solved. The needs of the electric roads set forth with an outline of the new kind of franchise necessary; question is of paramount interest to the public. By P. H. Gadsden, chairman, committee of National Affairs, American Electrical Railway Ass'n. 3,500 words. Electrical Railway Journal, December 14. 15 cts.

A Two-Unit Automatic Substation. The Rhode Island Company's Substation at Oakland illustrates the latest practice in this important field; author goes into economics of automatic substation application. By Walter C. Slade, supt. of power and lines, Rhode Island Co., Providence, R. I. 13 ills., 3,900 words. Electric Railway Journal, December 14, 15 cts.

New Philadelphia Co-operative Plan. Announced by Pres. Mitten to take place of 1911 plan; organization of committees described; plan has been indorsed by employees and National War Labor Board. 1 ill., 2,000 words. Electric Railway Journal, December 28. 15 cts.

Municipal Electric Railway in Minneapolis. 200 words. Municipal Journal, December 21. 10 cts.

Efficient Operation with the Skip-Stop Service. Specially prepared by the United States Fuel Administration. 1 ill., 1,000 words. Electric Railway Journal, December 14. 15 cts.

Women Operate "One-Man" Cars in Keokuk. Results have been uniformly satisfactory; women do not lose their heads in emergencies. 1 ill., 800 words. Electric Railway Journal, December 28. 15 cts.

Scientific Regulation Needed by Railroads. Theodore P. Shonts comments upon the railroad situation, expressing doubt that city partnership idea would be applicable. 400 words. Electric Railway Journal, December 28. 15 cts.

Fares:

Zone Fare Collection As Seen by a British Tramway Manager. The methods used on a typical road are described, together with the arrangement of the stages and the type of tickets issued to passengers. 3 ills., 1,800 words. Electric Railway Journal, December 28. 15 cts.

Zone System Proposed for Boston. Two zones with fare in central zone 5, 6 or 7 cents recommended by Prof. Richey; Peter Witt prefers short zones with lower fares. 2,600 words. Electric Railway Journal, December 28. 15 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Street Cleaning:

Street Cleaning in Philadelphia. Civic organizations plan to seek legislative authority for city to do its own work. 600 words. Good Roads, December 7. 10 cts.

Street Cleaning in Pittsburgh, Pa. Mechanical devices cannot render entirely obsolete the man with the broom. 4 ills., 500 words. Municipal and County Engineering, December. 25 cts.

Patrol Street Cleaning in New York. A new experiment being tried by the superintendent of the fourth street cleaning district in Manhattan. 300 words. Municipal Journal, December 21. 10 cts.

Snow Removal:

Snow Removal on Trunk Line Highways. State supervision required; continuous service demanded and long hours requisite; use of road machinery for snow removal. By Chas. I. Bennett, state highway commissioner of Connecticut. 3 ills., 1,900 words. Municipal and County Engineering, December. 25 cts.

New Jersey Plans for Keeping Roads Clear of Snow. Snow removal to be done by the counties, not by the state. A plan decided upon by the representatives of the Highways Transport Committee of the N. J. State Council of Defense, engineers and supervisors. 1 ill., 300 words. Municipal Journal, December 28. 10 cts.

Organization, Methods and Equipment Employed in Removing Snow from Main Roads in Pennsylvania. Use of road machinery and motor trucks with plow attachments; attention to drainage; development of snow removal in Pennsylvania. 4 ills., 2,100 words. Municipal and County Engineering, December. 25 cts.

Snow Fences for Highways. Used to prevent drifts on highways in the state of Pennsylvania. From a paper by Geo. H. Biles, second deputy state highway commissioner of Pennsylvania. 400 words. Municipal Journal, December 21. 10 cts.

Snow Removal from Trunk Line Highways. Pennsylvania methods of keeping the main roads open in winter. 2,300 words. Engineering and Contracting. December 4. 15 cts.

Sand Spreading Device of San Francisco Street Cleaning Department. For alleviating the slippery condition of streets in wet weather; sand spreader is attached to Elgin street sweeper. By C. W. Geiger. 1 ill., 500 words. Engineering and Contracting, December 4. 15 cts.

Refuse Disposal:

Pittsburgh Garbage Disposal Report. Recent information concerning methods at Baltimore, Chicago, Cincinnati, Cleveland, Kansas City, Milwaukee, Minneapolis, New York, Philadelphia, St. Louis, St. Paul and Washington; methods recommended for Pittsburgh. 1 table, 3,500 words. Municipal Journal, December 14. 10 cts.

Pittsburgh Garbage Disposal Report. Recommendations of committee that department of public works collect garbage and rubbish; incineration of rubbish and reduction of garbage. 1,600 words. Municipal Journal, December 21. 10 cts.

Waste Products of Cities and the War. Need of waste products for fertilizers; methods of disposal of sewage, street sweepings, trade wastes, dead animals, and garbage; incineration; reduction; feeding to swine; effects of war. By W. T. Knowlton, engineer of sewers, Los Angeles, Cal. 4,500 words. Municipal Journal, December 28. 10 cts.

Organization for Waste Reclamation. Organization of councils in various cities and towns for salvaging waste materials. 1,300 words. Municipal Journal, December 21. 10 cts.

CITY PLANNING.

City Planning. Editorial discussion of the article by James W. Routh and Frank P. Cartwright in this issue. 600 words. Municipal Journal, December 7. 10 cts.

Set-Back Lines. Power to establish them from a legal standpoint; opinions of legal authorities and courts. By Wm. J. Locke, secretary, California League of Municipalities, from "Pacific Municalities." 1,600 words. Municipal Journal, Dec. 21. 10 cts.

City Plan Commission. Their organization and effectiveness; opinions from ten cities analyzed and compared; organization adopted by Rochester, N. Y. By James W. Routh, Rochester Bureau of Municipal Research, and Frank P. Cartwright, ass't engineer. 2,000 words. Municipal Journal, December 7. 10 cts.

Land Development, Transportation and Housing. Letter to the editor from A. G. Dalzell, consulting engineer, Vancouver, on the important connection between the method of developing the land—including the method of planning and constructing the streets—and the building operations and housing schemes. 1,200 words. Canadian Engineer, December 26. 15 cts.

Housing Problems and Their Relations to the After-War Construction Program. Betterment of housing conditions essential to reduce ill health and conserve human energy and manpower. By Mark C. Cohn, director of housing, California State Immigration and Housing Commission. 1,700 words. Pacific Municipalities, December. 30 cts.

The Community House—An Element in Reconstruction. How chambers of commerce can promote sane progress and honor their townsmen who have served in the war, by raising funds for "Liberty Buildings" as soldiers' memorials. By Samuel Wilson, manager, Chamber of Commerce, Kansas City, Kan. 3,000 words. American City, December. 35 cts.

Labor Turnover Reduced and Financial Savings Effected by Better Housing. Important economic and engineering problems discussed at meeting of National Housing Ass'n. 1,000 words. Engineering News-Record, December 12. 20 cts.

Government and Finance:

Progress, Prospects and Pitfalls of the New Profession of City Manager. The Lockport bill; prospects of commission manager form; obstacles in the way of the new profession. By O. E. Carr, city manager, Springfield, O. 2,500 words. Canadian Engineer, December 12. 15 cts.

Combining Democracy with Efficiency in City Government. Trained executive should be charged with the business details, but the general policy should be decided by a council representing all the citizens as near as possible. By Walter J. Millard, field-secretary for the American Proportional Representation League. Pacific Municipalities, December. 30 cts.

Collective Public Service Operation. As proposed for the four towns on the south shore of the St. Lawrence river, opposite Montreal. By Roger DeL. French, consulting engineer. 900 words. Canadian Engineer, December 19. 15 cts.

War-Time Problems of the Utilities Commission. Illinois commission during recent period confronted with necessity to speed rate cases and with other serious problems. 1,400 words. Electrical World, December 7. 15 cts.

How Will Our Cities Pay for Future Improvement and Public Services? Brief resume of the practice of the leading cities of the U. S. in levying special assessments for municipal improvements and public services. 4,700 words. American City, December. 35 cts.

MISCELLANEOUS.

Industrial Outlook:

Building Industries Conference at Ottawa. Nearly 200 general contractors, sub-contractors and representatives of supply firms form active new national organization to be known as the "Association of Canadian Building and Construction Industries"; national reconstruction problems discussed and large amount of ground covered in busy three-day conference. 9 ills., 9,000 words. Canadian Engineer, December 5. 15 cts.

Reconstruction Minister, Discussing National Problems, Prophesies Considerable Industrial Activity. Hon. A. K. MacLean, chairman of the reconstruction committee of the Dominion Cabinet, addressed the members of the Association of the Canadian Building and Construction Industries at their Chateau Laurier, Ottawa. 1,400 words. Canadian Engineer, December 5. 15 cts.

War Emergency and Reconstruction Congress. Remarkable convention of American business men held at Atlantic City; able addresses and practical, farseeing platform; government ownership of railroads, wires and other utilities opposed. 2 ills., 5,700 words. Electrical Review, December 14. 30 cts.

Reconstruction Outlook in the Industry. Views of officials of companies in the industry and the opportunities in wise solution of the problems affecting cost and service to the consumer. 1 ill., 2,000 words. Electrical World, December 14. 15 cts.

Hasten Plans for Public Works. Editorial comment on the advisability of providing employment on public works for returning soldiers and released war workers. 600 words. Municipal Journal, December 21. 10 cts.

Hasten Improvements—But Plan Them Now. Adequate consideration necessary for large projects. 500 words. Municipal Journal, December 14. 10 cts.

1919 A Happy New Year. Editorial comment on the bright prospects of prosperity for the cities and the need of confidence of those in charge of city affairs. Plan at once for public works that will put money in circulation and give employment to those released from

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NEWS OF THE SOCIETIES

Feb. 25-28, 1919.—AMERICAN ROAD BUILDERS' ASSOCIATION. Sixteenth annual convention and Ninth American Good Roads Congress under the auspices of the A. R. B. A., Hotel McAlpin, New York, N. Y. Secretary, E. L. Powers, 150 Nassau street, New York, N. Y.

Nov. 12-14, 1919.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Bloomington, Ill.

American Water Works Association.

The nominating committee of the American Water Works Association has presented the following names as candidates for offices for 1919-1920: President, Carleton E. Davis, Philadelphia, Pa.; vice-president, M. L. Worrell, Meridian, Miss; treasurer, James M. Caird, Troy, N. Y.; trustees, W. H. Randall, Toronto, Ont. (District No. 1), and F. C. Jordan, Indianapolis, Ind. (District No. 4).

American Society of Civil Engineers.

At the annual meeting of the American Society of Civil Engineers a number of resolutions were passed and reports accepted.

President A. N. Talbot reviewed the activities of the society for the past year, and referred to the vital part played by engineers in the war. A total of 1,593 members, ranging from major generals and rear admirals down through the ranks, had entered the service. He mentioned the work of the American Engineering Standards Committee, and developed in detail many suggestive proposals for the future work of the society.

The Committee on Award of Prizes reported the following awards: The Norman Medal to L. R. Jorgensen for his paper, "Multiple-Arch Dams in Rush Creek, California"; the James R. Croes Medal to Israel V. Werbin for his paper, "Tunnel Work on Sections 8, 9, 10 and 11, Broadway-Lexington Avenue Subway, New York City"; the Thomas Fitch Rowland prize to F. W. Scheidenhelm for his paper, "The Reconstruction of the Stony River Dam"; the James Laurie prize to Charles W. Staniford for his paper, "Unusual Cofferdam for 1,000-Foot Pier, New York City," and the Collingwood prize for juniors to James B. Hays for his paper, "Designing an Earth Dam Having a Gravel Foundation With the Results Obtained in Tests on a Model."

Three new committees were organized during the year: (1) The Committee on Development, consisting of one member, appointed by each of the twenty-two local associations, and seven members at large, appointed by the president; (2) the New York Meetings Committee, with authority to arrange for the second meeting in each month; (3) a committee of the Board of Direction, appointed to keep it informed of any governmental or other programs looking to reconstruction or rehabilitation of the engineering resources of the country after the war.

The Nominating Committee for the coming year was elected as follows: District 1, J. J. Yates; District 3, F. P. Williams; District 5, J. F. Conway; District 6, N. F. Sprague; District 10, F. E. Weymouth; District 11, W. Fay Barnard, and District 13, H. L. Haehl.

The Special Committee on Engineering Education reported that after twelve years of work its final report was ready in the form of Dr. Mann's exhaustive studies, undertaken with the aid of the Carnegie Foundation. After sketching the history of technical education Desmond FitzGerald moved that the president appoint a committee of three to confer with the committee of other societies to insure careful and general discussion of Dr. Mann's report.

The preliminary report of the Committee on Development was accepted without discussion as a progress report.

A resolution was passed condemning the recent dismissal of about 350 engineers employed by the Public Service Commission for the First District of New York. Another resolution urged the carrying on of public works.

Marshall O. Leighton discussed the work of the National Service Committee, recently organized in Washington. An office has been established in the McLoughlin Building, Washington, and the work is now being financed by the residue of the appropriation made to the Engineering Council last year.

The election of officers was announced as follows:

President, Fayette Samuel Curtis, Boston; vice-presidents, to serve two years, Herbert Samuel Crocker, Denver, and Leonard Metcalf, Boston; for treasurer, to serve one year, Arthur Smith Tuttle, New York City; for directors, to serve three years, George Hallett Clark, New York City; Jacob Stinman Langthorn, New York City; Charles Clement Elwell, New Haven, Conn.; Willard Beahan, Cleveland; John Watson Alvord, Chicago, and Carl Ewald Grunsky, San Francisco.

At the afternoon meeting Brig.-Gen. R. C. Marshall, Jr., chief of the Construction Division, U. S. A., described in detail the work done in this country during the war.

National Highways Association—Division of Bridges.

Declaring itself in favor of placing bridges under the same jurisdiction as roads with regard to construction and to maintenance the organizing meeting of the Division of Bridges, National Highways Association, held on January 17 at New York, formulated plans for an active campaign in developing the national interest in highway bridges. Most important of the problems are those arising in the case of bridges over large rivers. At the motion of the chairman, Gustav

(*Continued on page* 122)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Pittsburg, Cal., has retained the consulting engineers, Olmsted & Gillelen, to prepare plans for a WATERWORKS SYSTEM.

Pitman, N. J., is to make PAVING IMPROVEMENTS according to plans prepared by the consulting engineering firm of Remington & Vosbury.

Parksville, Pa., contemplates making PAVING IMPROVEMENTS to cost $130,000, according to plans prepared by the consulting engineers, Stoneham & Butts.

Brookings, S. D., is planning to make PAVING IMPROVEMENTS, involving laying of pavements and storm sewers, according to plans prepared by the consulting engineer, L. P. Wolff.

Anderson county, Garnett, Kans., is to build a BRIDGE of reinforced concrete with three 60-foot spans and 18-foot roadway. The consulting engineer is H. A. Noble.

The commissioners of Macon county, Oglethorpe Ga., have advertised for bids for a REINFORCED CONCRETE BRIDGE over the Flint river. Plans were prepared by the consulting engineers, Garrett & Slack.

Oshkosh, Wis., is having plans prepared by the Scherzer Rolling Lift Bridge Co. for a BRIDGE over Fix River.

PAVING IMPROVEMENTS are contemplated by the city of Grafton, N. D., according to plans being prepared by the consulting engineering firm of Charles L. Pillsbury Co.

Findlay, Ill., has had plans drawn for the construction of a SEWERAGE SYSTEM. The consulting engineers are Miller, Holbrook & Warren.

A BRIDGE is to be built by Hummelstown, Pa., plans for which have been prepared by the consulting engineer, Clinton M. Hershey.

A GRAVITY SEWERAGE SYSTEM is to be built in spring by the city of Auburn, Me., according to plans prepared by the consulting engineer, H. K. Barrows.

Bids have been advertised for by the commissioners of the Thompson Drainage and Levee district, Fulton county, Lewiston, Ill., for extensive DRAINAGE and LEVEE WORK. The consulting engineers are Goodell & Fulton.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

PORTABLE PUMPING APPARATUS.

"Seco" Equipment for Cleaning Catch-basins, etc.

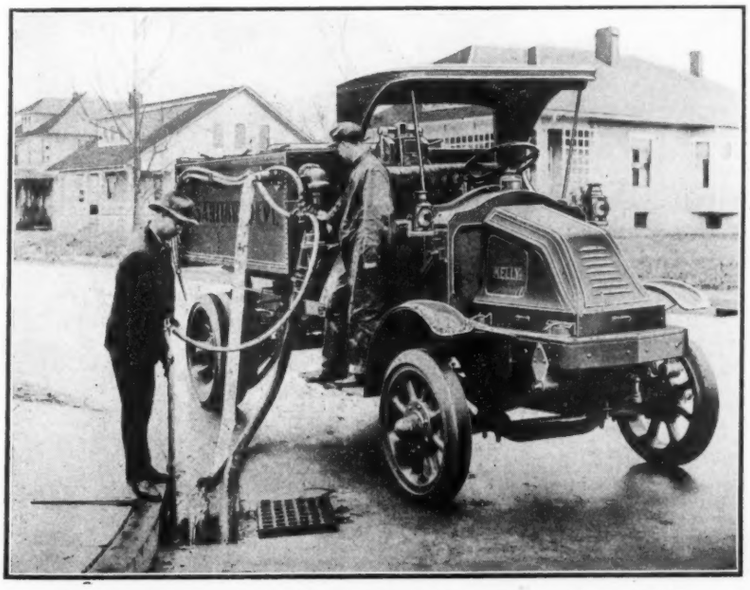
This is an appliance the chief purpose of which is to clean catch-basins and similar receptacles of dirt and filth; but it can be connected into a motor truck with water-tight dump body; can be used for spraying trees, for irrigation pumping, and other purposes, and for sprinkling and flushing streets. It can also be used as a heavy-duty dump truck for handling coal, coke, ashes or heavy building material. No cranes or hoists are used in changing it from one of these purposes to another.

The chassis carries a covered tank, and in the front of this a pump with various hose connections. The tank is supplied with a hose for removing the overflow and for filling the tank with water from a fire hydrant. Immediately behind the driver and securely attached to the back of the seat are placed all the operating levers. There is a space under the tank for storing the covers when it is not desired to use them. There are no parts projecting beyond the wheels of the vehicle, except as the hose may be drawn out temporarily during catch-basin cleaning.

To clean a catch-basin, the pump discharges water from the tank into the catch-basin to soften up the dirt, and the mixture of dirt and water is removed and discharged into the tank by the suction created by water pumped from the tank through a foot piece in the basin. The dirt settles in the tank and the water is used over and over again. As dirt accumulates, the surplus water escapes through the overflow hose into the gutter. The dirt from the basin does not pass through the pump, which therefore is not choked or worn by it. The dirt accumulating in the tank is dumped where desired by a mechanically operated dumping hoist.

The pump can be used for spraying trees, the tank holding the spraying solution. Or the covers can be removed from the tank, the pump disconnected, and the apparatus used as a watertight dumping truck for collecting garbage or other materials containing water. In order that it may be used for sprinkling or flushing, the manufacturers furnish attachments for this purpose, controlled by levers within reach of the driver.

This equipment, which is shown in the accompanying illustration, is manufactured by the Springfield Engineering Company.



PORTABLE PUMPING EQUIPMENT CLEANING CATCH-BASIN.

INDUSTRIAL NEWS

The Steel Situation.

Recent orders received by the steel mills show a slight improvement, but the gain is small in point of tonnage and the total of new buying is frankly admitted to be quite insufficient to carry the mills at their present rate of operation for various periods, and in capacity. The shipments are chiefly against old orders.

The steel being bought is generally for repair work and for the manufacture of ordinary goods. There is little steel being bought that would be used for construction work—bridges, buildings, factories, etc.

The opinion expressed by a majority of the steel producers in Pittsburgh is that there will be no further declines in prices for some time, probably until April 1. In some quarters the attempt is made to argue that there will be no further declines, but that rather the public will eventually become accustomed to paying present prices, the prediction being qualified by the statement that it assumes there will be no wage reductions.

Possibly April 1 is set as the date before which further declines in iron and steel prices will not occur on account of its representing the date to which the War Industries Board would have set prices if it had decided to continue fixing them. Now there is a desire to see if the trade cannot acquire the habit of voluntarily making its price changes on the quarterly dates, pursuing the course that was followed during government fixing.

While steel producers are watching the situation keenly for possible breaks in prices, the common view is that there will be none during the present order of things, for the reason that there is no incentive or temptation to cut prices. Buyers evince no interest in late deliveries, irrespective of price. What little buying is occurring is for very prompt delivery, the delivery rather than the price being the item of interest to buyers.

National Federation of Construction Industries.

At the first meeting of the officers and directors of the permanent organization of the National Federation of Construction Industries, held at the Blackstone Hotel, Chicago, January 15 and 16, the following executive committee was elected: B. F. Affleck, F. T. Miller, A. M. Maddock, J. T. Duryea and J. R. Wiggins.

In pursuance of a resolution providing for a Special Conference Committee on Publicity to confer with the "Own Your Own Home" Committee of the National Association of Real Estate Boards and with the Division of Public Works and Construction Development of the United States Department of Labor the chair appointed the following: Louis Bruch and B. S. Smith, Chicago; L. A. Putnam, New Orleans; W. T. Rossiter and E. A. Roberts, Cleveland.

The formation of a Committee on Industrial Conditions was referred to the Executive Board.

The following Export Committee was appointed: J. T. Duryea, chairman; J. A. Kling, B. F. Affleck, J. L. Kaul.

The following committees were established, with chairmen as agreed upon, the further personnel to be selected later: Finance operations, F. T. Miller; transportation, W. D. Dickey; commercial arbitration, O. K. Foster; business ethics and practice, L. McNamara; conservation, B. F. Affleck; legislation, J. L. Kaul; cost accounting, J. A. Kling; legislation, J. R. Wiggins.

NEWS OF THE SOCIETIES

(*Continued from page 120*)

Lindenthal, of New York, the division declared itself prepared to co-operate in the study of problems of large river crossings on the request of local authorities.

The division, headed by Mr. Lindenthal, is composed of Adm. H. H. Rousseau, Washington; Professor George F. Swain, Boston; Frank C. Osborn, Cleveland; C. A. Wilson, Cincinnati; Edwin Duryea, San Francisco; R. D. McCarter, New York; Professor E. J. McCaustland, University of Missouri; Professor Donald Derickson, Tulane University; F. E. Schmitt, New York, and Charles Evan Fowler, New York, secretary. On invitation Professor Arthur H. Blanchard, Columbia University, joined the division to represent the general highway aspects of the subject more directly.

General discussion of the situation and requirements of the highway network of the country with respect to crossings of large rivers, especially interstate streams, brought to attention a very extensive neglect of adequate provision for communication at such points. The Missouri River has a length of 350 miles in the state of Missouri, but only three highway crossings, one at each end of the stretch and one near the middle; the Hudson River has not a single highway crossing in 150 miles from its mouth to Albany; the Ohio River is still more poorly equipped with road bridges; the Mississippi River is without a road crossing below Memphis. It was the sense of the meeting that the most important responsibilities resting on the division lay in stimulating and giving assistance to efforts toward the construction of additional lines of communication across the large rivers. In view of the fact that far more railway crossings exist than highway crossings, and that in building a railway bridge it is usually practicable at small additional cost to provide for a highway also, it was proposed to assist all efforts to secure highway accommodation on new railway bridges. At the present time various burdensome laws are obstacles in the way of such provisions, and the division will, where requested, use its endeavor to promote remedial legislation by which this difficulty may be overcome.

While the division's work will lie essentially in a field not now covered by the activities of state highway departments, the meeting recorded itself in favor of full co-operation with the state departments in the view that fullest success in dealing with highway bridge problems can only be secured through the harmonious joint efforts of all concerned. Co-operation with national port authorities was also considered with favor in so far as a bridge may be a necessary co-ordinating element in a large port.

New England Water Works Association.

The February meeting of the New England Water Works Association will be held at the Hotel Brunswick, Copley Square, Boston, Mass., on Wednesday, Feb. 12.

Following a meeting of the executive committee at headquarters, lunch will be served at the hotel at 1.00 p. m. At 2.00 p. m. will take place the formal presentation of the Dexter Brackett memorial medal for the year 1917.

The following papers will be presented: "Some Practical Uses of Rainfall Records" (illustrated), by L. M. Hastings, city engineer, Cambridge, Mass.; "Measurement of Rainfall," by Robert E. Horton, hydraulic engineer, Albany, N. Y.

Florida Engineering Society.

The Florida Engineering Society recently held it annual meeting at Jacksonville. In presenting the report of the committee on harbor improvements, W. W. Fineren, United States junior engineer, United States Engineer's Office, Jacksonville, emphasized the need of municipalities taking a more active interest in developing the harbor facilities of Florida, and indicated many possibilities for expansion. In the report of the president of the society emphasis was given to the lack of recognition for engineering service, including a statement that although engineers, by training and experience, are fitted for civic duties, they have in the past been seldom appointed to civic boards and commissions.

The following officers were elected: President, B. Johnson, Miami; vice-president, G. B. Hills, Jacksonville, and secretary, J. R. Benton, Gainesville.

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war work. 400 words. Municipal Journal, December 28. 10 cts.

Construction:

Pneumatic Method of Concrete. Adapted for heavy, difficult concrete work; plant consists of a mixer, a pipe conveying system and a compressed air plant. 2 ills., 2,400 words. Engineering and Cement World, December 1. 15 cts.

Compressing Concrete Increases Its Strength. Plain columns of successive layers pressed down averages half again as strong as those poured for full length. By Frank P. McKibben, professor of civil engineering, Lehigh University, Bethlehem, Pa. 3 ills., 1,600 words. Engineering News-Record, December 5. 20 cts.

Supreme Court Fixes Responsibility of Contracts. Contractor not answerable for consequences of defects in plans and specifications; Spearin case decided. 1,300 words. Engineering News-Record, December 26. 20 cts.

Twin Peaks Tunnel Completed in San Francisco. One of the most expensive and spectacular engineering feats of this year; constructed by the Municipal Railway Company. 3 ills., 1,400 words. Engineering and Cement World, December 1. 15 cts.

General:

Engineering Societies to Have Employment Bureau. Decision of the engineering council; replying to letter on reconstruction commission, President Wilson favors existing machinery. 1,000 words. Electrical World, December 7. 15 cts.

Problems Before the Civil Engineers' Society. 3 alternative plans of organization and their logical results are discussed; more representative form inevitable. By Gardner S. Williams, Ann Arbor, Mich. 1,600 words. Engineering News-Record, December 5. 20 cts.

National Association of Contractors. Met in Chicago, Nov. 20-21, and completed organization efforts begun at Atlantic City last July; constitution adopted and officers elected. 2,600 words. Engineering and Cement World, December 1. 15 cts.

Engineering Educators Convene at Boston. Welcome to British mission and discussion of the lessons of the war for technical instructors features of meeting; broader training for engineers and necessity for greater thoroughness in professional preparation urged. 2,900 words. Electrical World, December 14. 15 cts.

Engineering Education Affected by War Expenience. Dr. C. R. Mann discusses future due to war training; effects upon academic standards. 2,000 words. Engineering News-Record, December 12. 20 cts.

Federal Investigations for the Public Welfare. Investigations in all branches of science should be carried on continuously by experts retained by the Government for that purpose. Great possibilities in united action for the general good. 900 words. Municipal Journal, December 28. 10 cts.

The Relation Between Civil and Military Engineering. Fundamentals are the same; same strategy, different tactics. By Major-General Wm. M. Black, chief of engineers, U. S. Engineering Department. 2,800 words. Canadian Engineer, December 26. 15 cts.

Practical Measures for Securing Greatest Economy in Public Utility Plant Operation. Proper use of recording and indicating instruments; small plant conditions; the bonus system; some examples of plant neglect. By Chas. Brossman, consulting engineer U. S. Fuel Administration on Utility Plants in Indiana. 2,000 words. Municipal and County Engineering, December. 25 cts.

Just Values and Fair Rates Needed. Investment bankers point out requirements of utility situation; Mr. Taft says outlook is not good. 1,000 words. Electric Railway Journal, December 14. 15 cts.

Design of Concrete Truss Bridges. Discussion of theoretical and practical points resulting from designs proposed for bridges on the Toronto-Hamilton highway; method of computing stresses in arched chord; expansion plates; splice of lower and arched chords. By Frank Barber, consulting engineer, Toronto. 1,200 words. Canadian Engineer, December 26. 15 cts.

St. John River Affords Big Opportunities. For development of the natural resources of the maritime provinces; reclamation of waste land by drainage; utilization of water powers; site proposed for new tideless harbor. By Frank S. Small, B.Sc. 3 ills., 7,000 words. Canadian Engineer, December 5. 15 cts.

Developing Irrigated Land with Selected Settlers. In California experiment, real estate sharks have been eliminated and expert agencies called in to help sales problems. 3 ills., 4,300 words. Engineering News-Record, December 5. 20 cts.

Methods and Cost of Maintenance of a twenty-seven and a half acre Park System. Two tables—labor cost of maintaining park system, and water used for sprinkling. By H. R. Ferriss. 1,400 words. Engineering and Contracting, December 4. 15 cts.